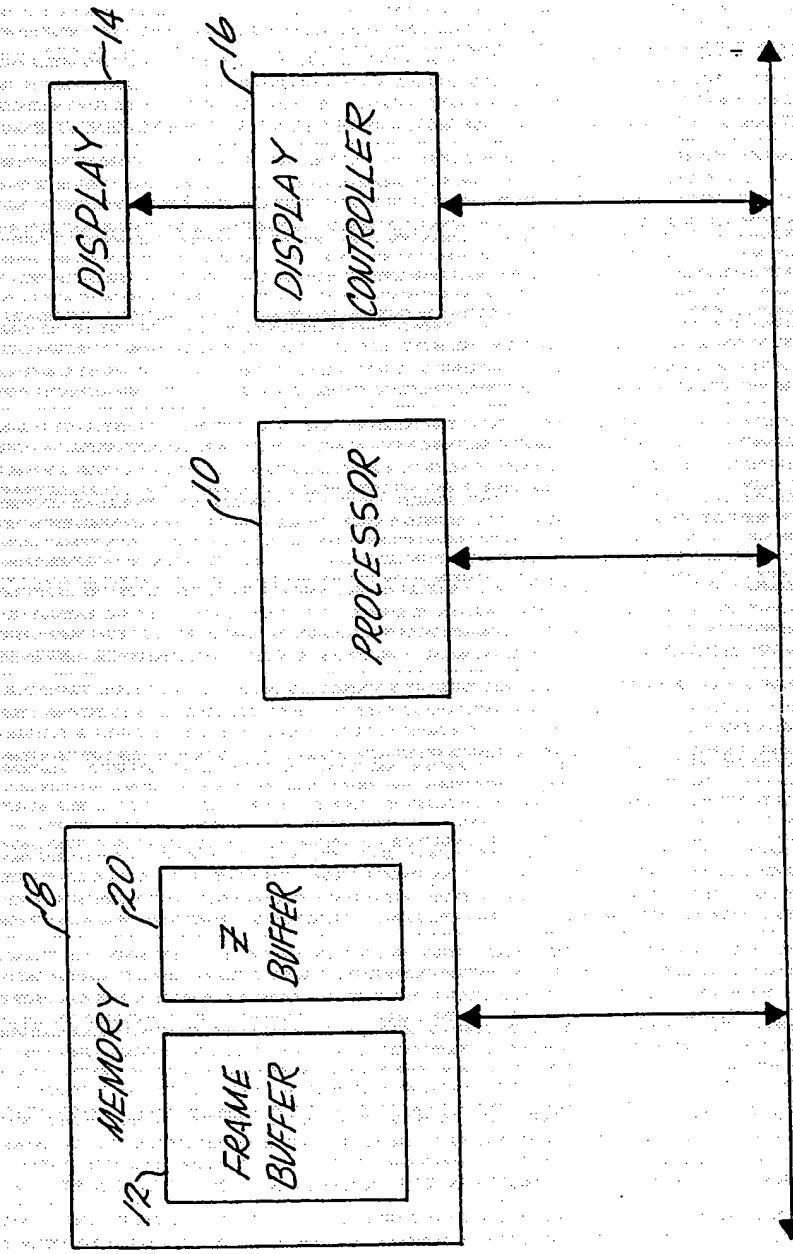
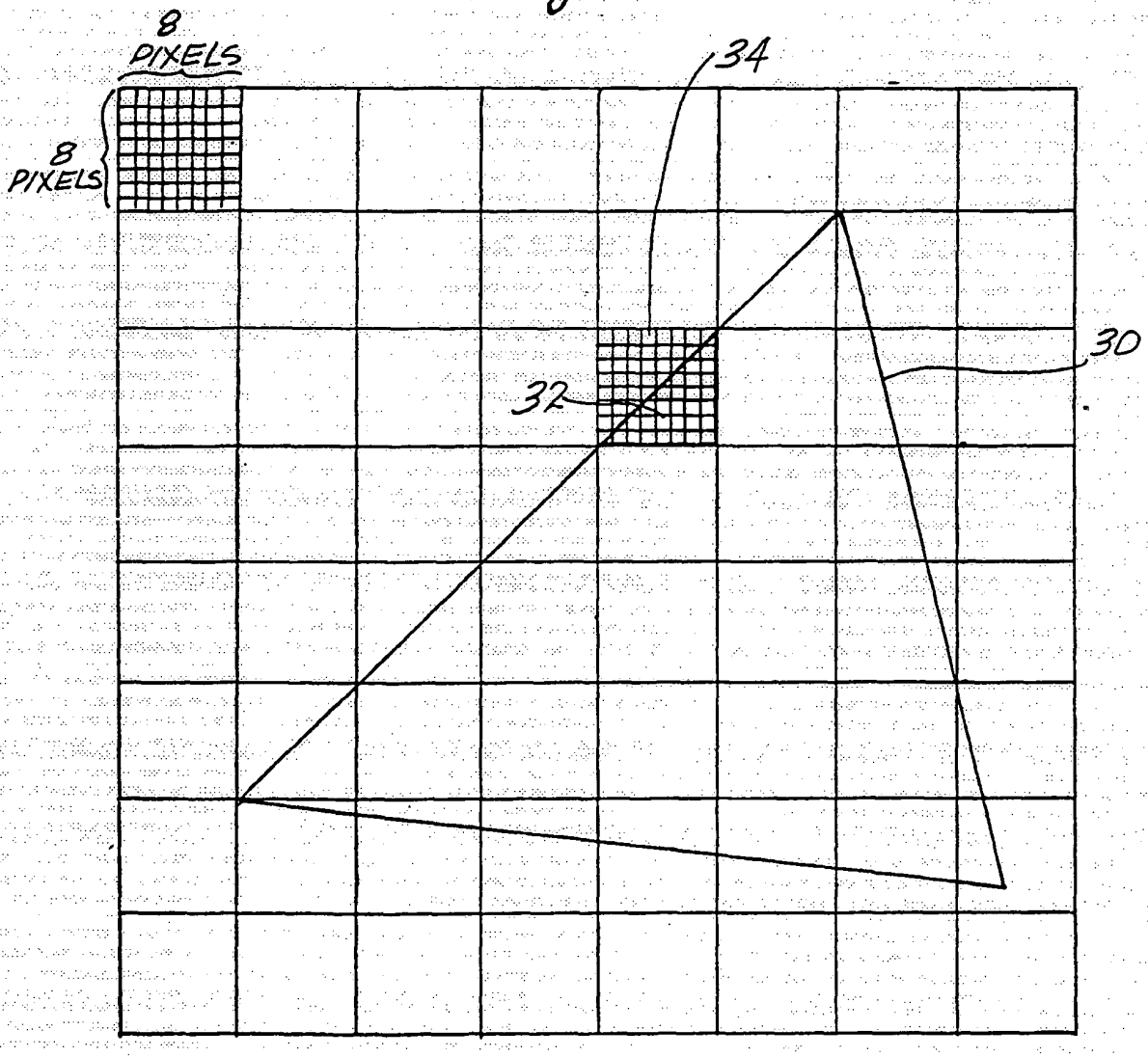


Fig. 1
(PRIOR ART)

Fig. 2



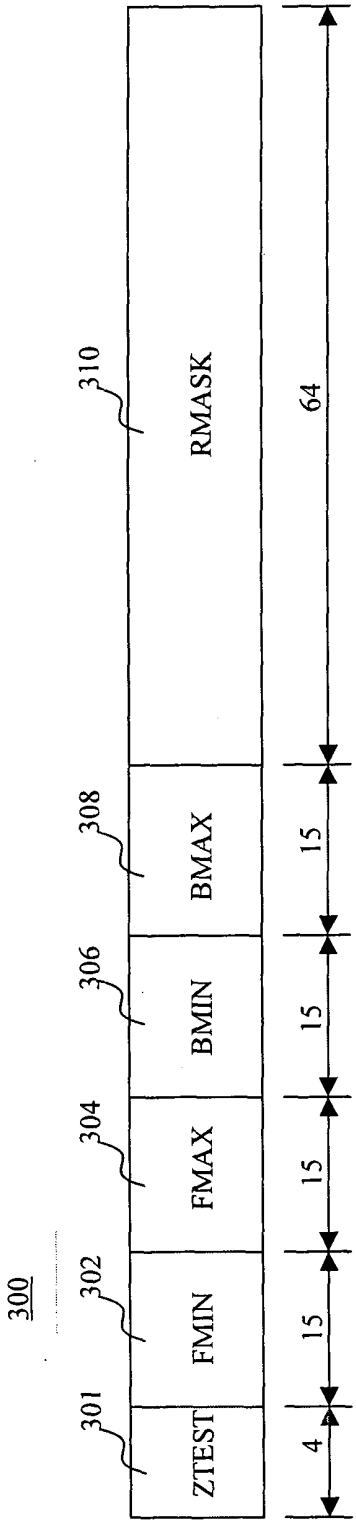


Fig. 3

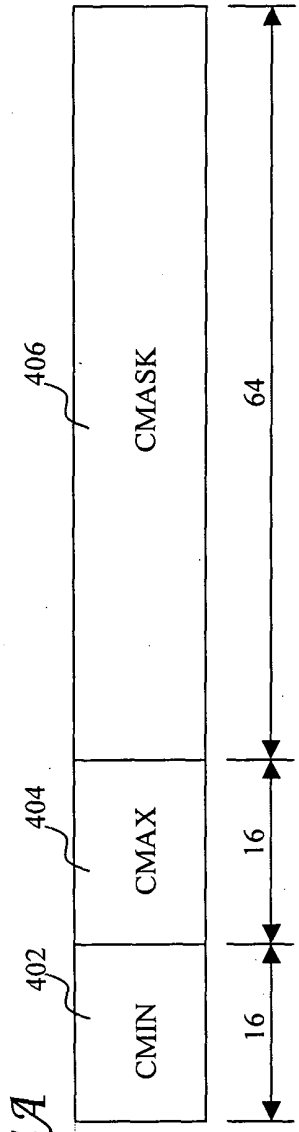


Fig. 4A

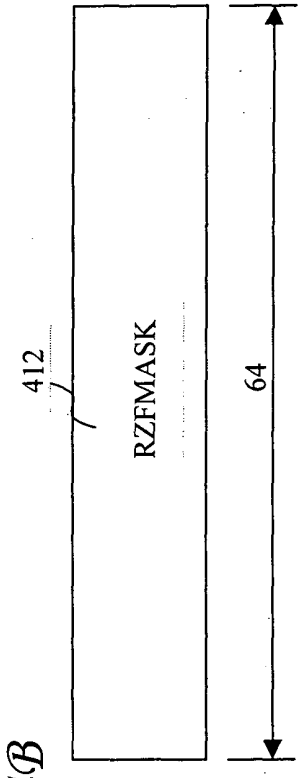


Fig. 4B

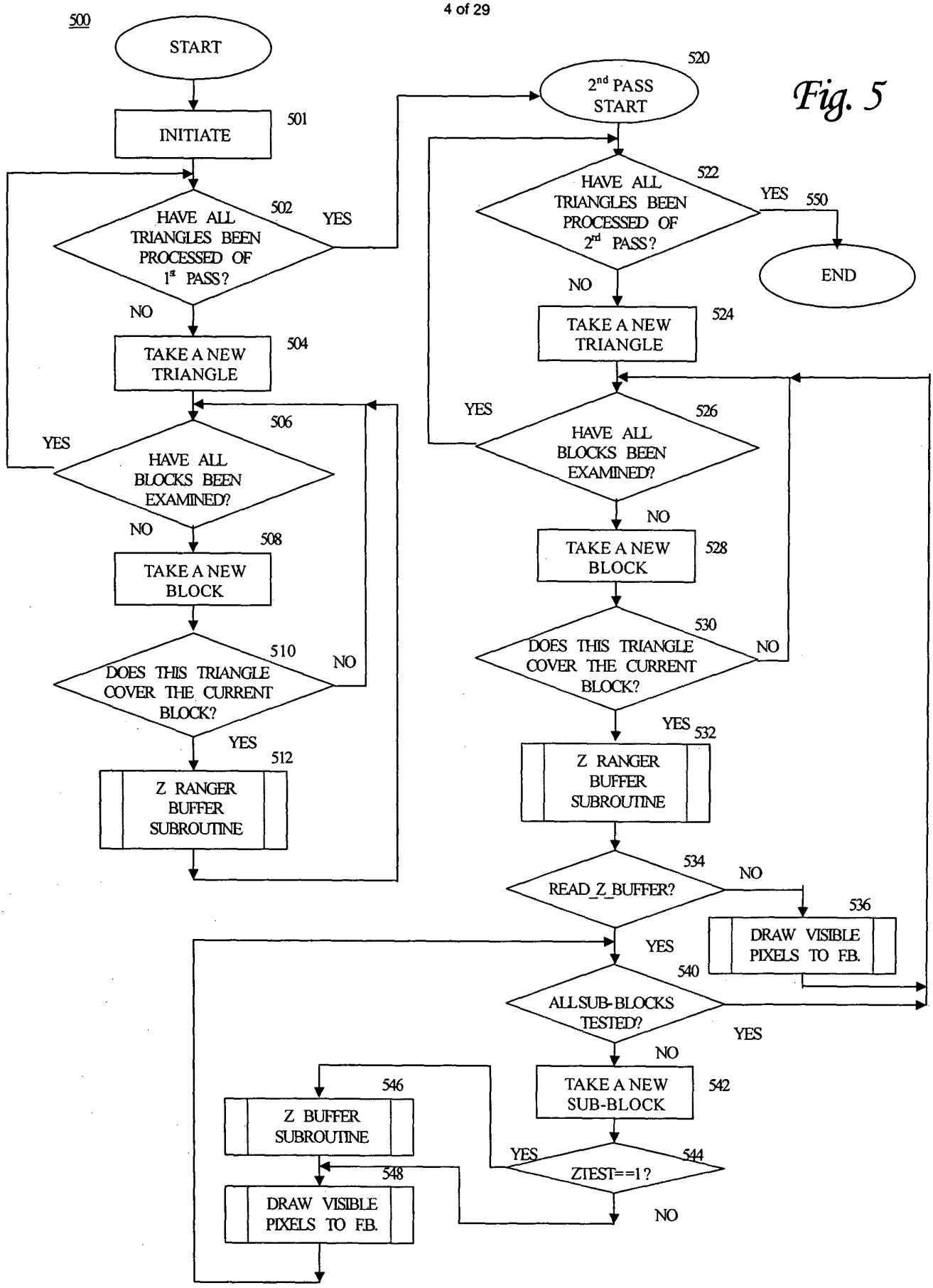

500
START
INITIATE
501
HAVE ALL TRIANGLES BEEN PROCESSED OF 1st PASS?
502
YES
NO
TAKE A NEW TRIANGLE
504
HAVE ALL BLOCKS BEEN EXAMINED?
506
YES
NO
TAKE A NEW BLOCK
508
DOES THIS TRIANGLE COVER THE CURRENT BLOCK?
510
NO
YES
Z RANGER BUFFER SUBROUTINE
512
2nd PASS START
520
HAVE ALL TRIANGLES BEEN PROCESSED OF 2nd PASS?
522
YES
550
END
NO
TAKE A NEW TRIANGLE
524
HAVE ALL BLOCKS BEEN EXAMINED?
526
YES
NO
TAKE A NEW BLOCK
528
DOES THIS TRIANGLE COVER THE CURRENT BLOCK?
530
NO
YES
Z RANGER BUFFER SUBROUTINE
532
READ_Z_BUFFER?
534
NO
DRAW VISIBLE PIXELS TO F.B.
536
YES
ALL SUB-BLOCKS TESTED?
540
YES
NO
TAKE A NEW SUB-BLOCK
542
ZTEST==1?
544
YES
NO
Z BUFFER SUBROUTINE
546
DRAW VISIBLE PIXELS TO F.B.
548

Fig. 5

Fig. 6A

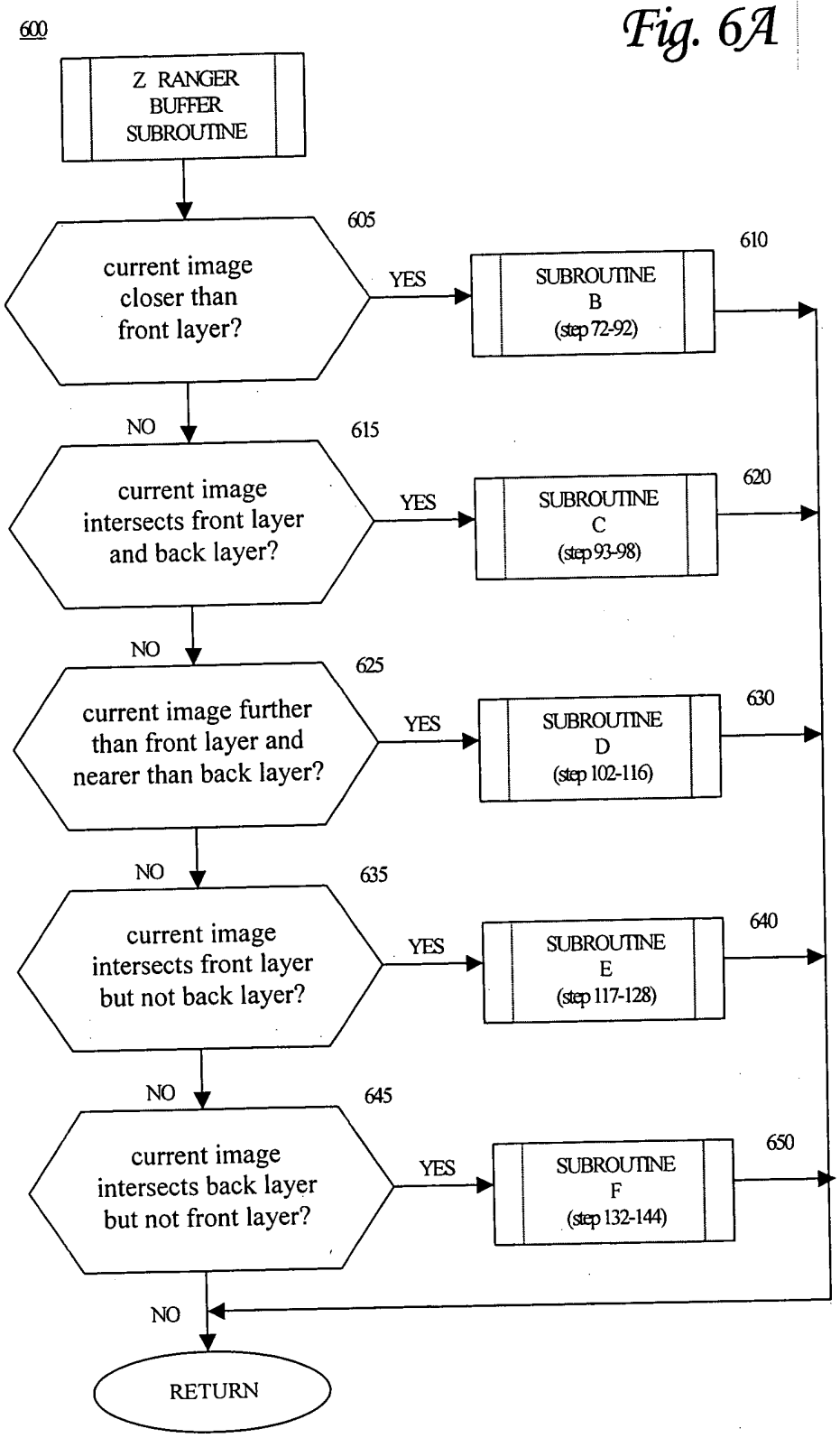

600
Z RANGER BUFFER SUBROUTINE
605
current image closer than front layer?
YES
610
SUBROUTINE B (step 72-92)
NO
615
current image intersects front layer and back layer?
YES
620
SUBROUTINE C (step 93-98)
NO
625
current image further than front layer and nearer than back layer?
YES
630
SUBROUTINE D (step 102-116)
NO
635
current image intersects front layer but not back layer?
YES
640
SUBROUTINE E (step 117-128)
NO
645
current image intersects back layer but not front layer?
YES
650
SUBROUTINE F (step 132-144)
NO
RETURN

Fig. 6B

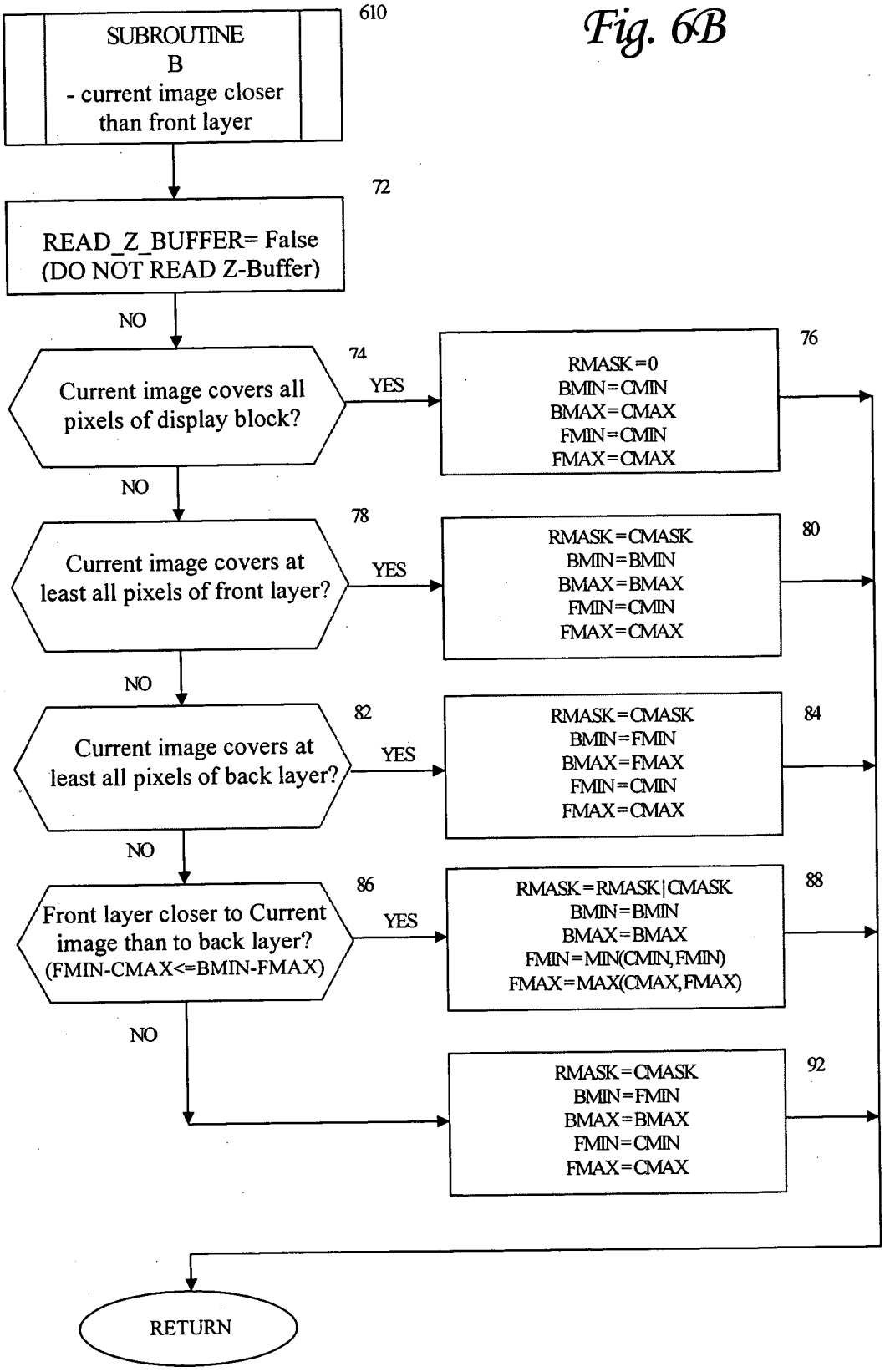
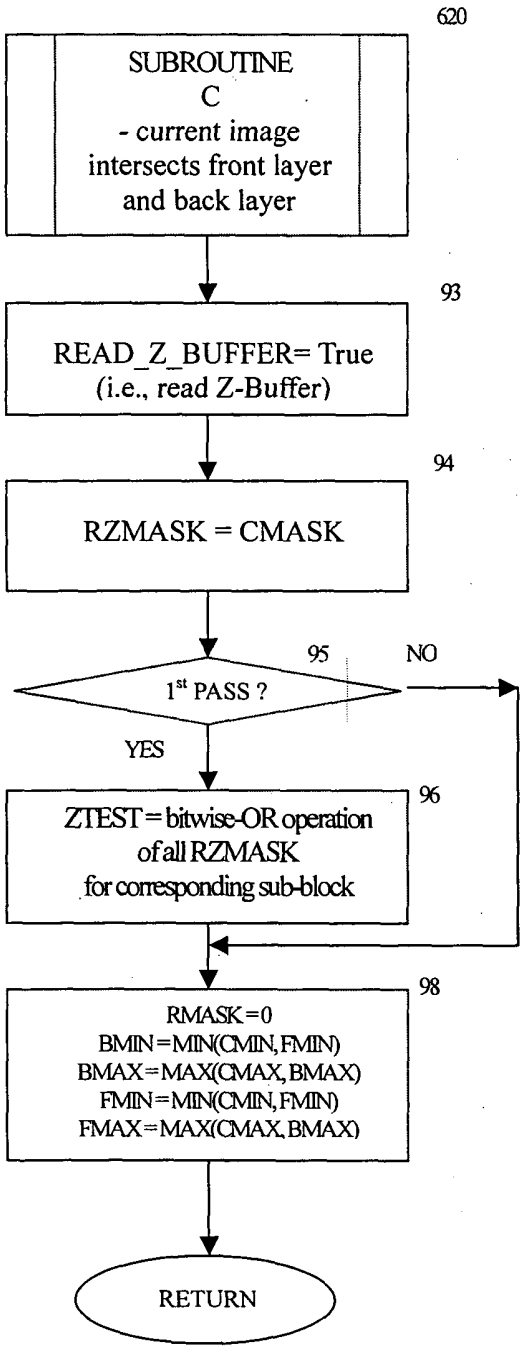

610
SUBROUTINE B - current image closer than front layer
72
READ_Z_BUFFER= False (DO NOT READ Z-Buffer)
NO
74
Current image covers all pixels of display block?
YES
RMASK=0
BMIN=CMIN
BMAX=CMAX
FMIN=CMIN
FMAX=CMAX
76
NO
78
Current image covers at least all pixels of front layer?
YES
RMASK=CMASK
BMIN=BMIN
BMAX=BMAX
FMIN=CMIN
FMAX=CMAX
80
NO
82
Current image covers at least all pixels of back layer?
YES
RMASK=CMASK
BMIN=FMIN
BMAX=FMAX
FMIN=CMIN
FMAX=CMAX
84
NO
86
Front layer closer to Current image than to back layer? (FMIN-CMAX<=BMIN-FMAX)
YES
RMASK=RMASK|CMASK
BMIN=BMIN
BMAX=BMAX
FMIN=MIN(CMIN,FMIN)
FMAX=MAX(CMAX,FMAX)
88
NO
RMASK=CMASK
BMIN=FMIN
BMAX=BMAX
FMIN=CMIN
FMAX=CMAX
92
RETURN

Fig. 6C


620
SUBROUTINE C - current image intersects front layer and back layer
93
READ_Z_BUFFER= True (i.e., read Z-Buffer)
94
RZMASK = CMASK
95
NO
1st PASS ?
YES
96
ZTEST = bitwise-OR operation of all RZMASK for corresponding sub-block
98
RMASK = 0
BMIN = MIN(CMIN, FMIN)
BMAX = MAX(CMAX, BMAX)
FMIN = MIN(CMIN, FMIN)
FMAX = MAX(CMAX, BMAX)
RETURN

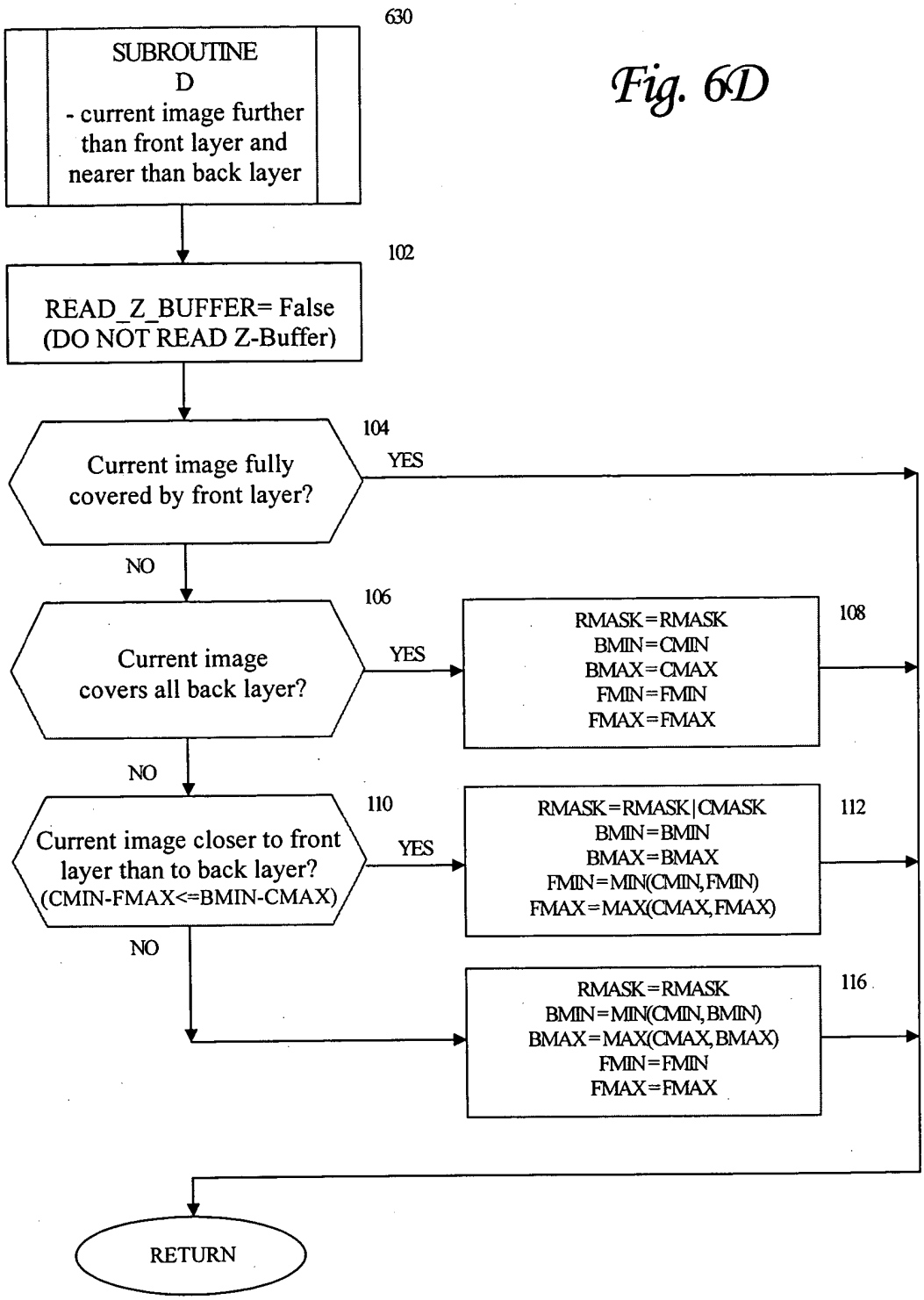

630
SUBROUTINE D - current image further than front layer and nearer than back layer
102
READ_Z_BUFFER= False (DO NOT READ Z-Buffer)
104
Current image fully covered by front layer?
YES
NO
106
Current image covers all back layer?
YES
RMASK=RMASK
BMIN=CMIN
BMAX=CMAX
FMIN=FMIN
FMAX=FMAX
108
NO
110
Current image closer to front layer than to back layer? (CMIN-FMAX<=BMIN-CMAX)
YES
RMASK=RMASK|CMASK
BMIN=BMIN
BMAX=BMAX
FMIN=MIN(CMIN,FMIN)
FMAX=MAX(CMAX,FMAX)
112
NO
RMASK=RMASK
BMIN=MIN(CMIN,BMIN)
BMAX=MAX(CMAX,BMAX)
FMIN=FMIN
FMAX=FMAX
116
RETURN

Fig. 6D

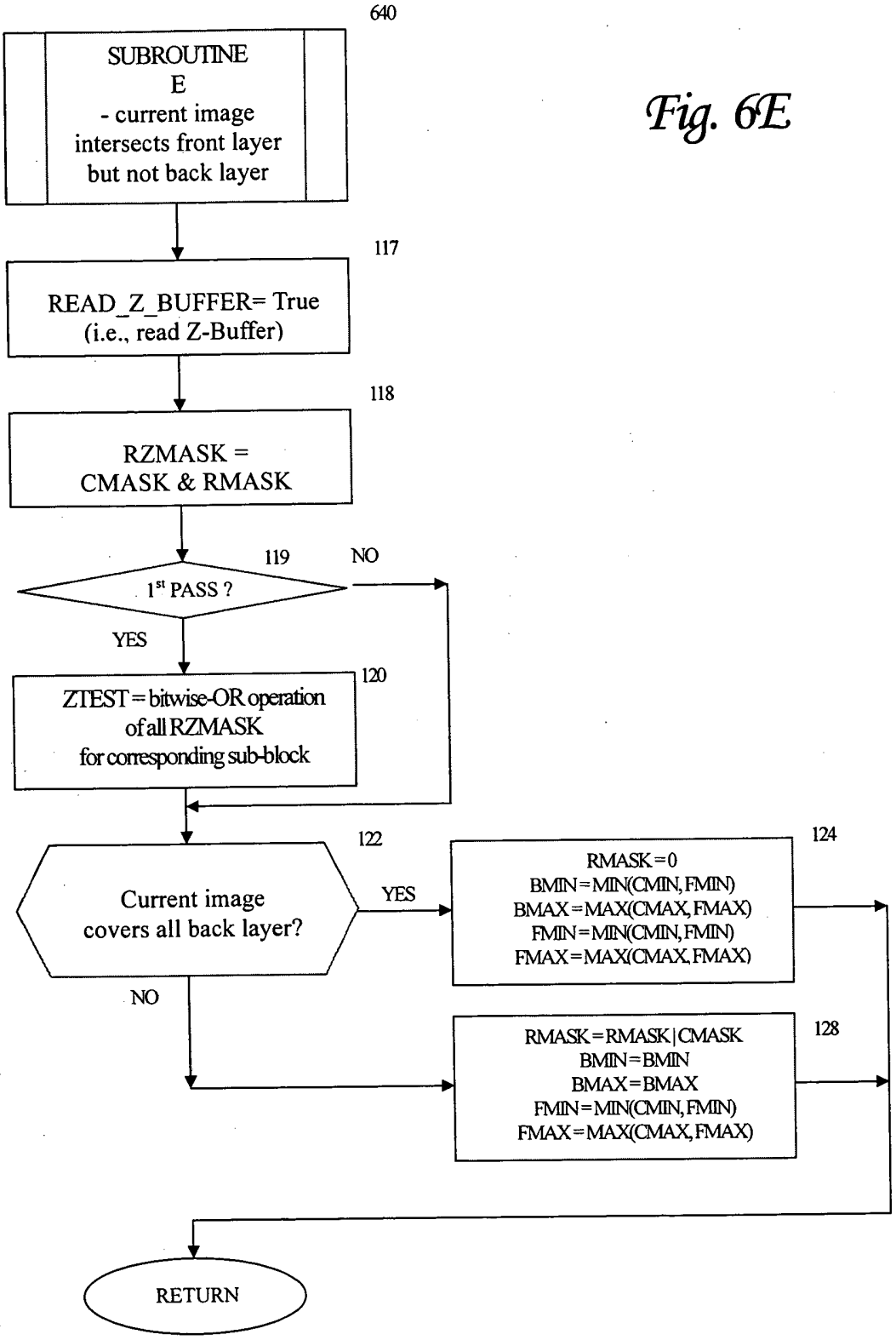

640
SUBROUTINE
E
- current image
intersects front layer
but not back layer
117
READ_Z_BUFFER= True
(i.e., read Z-Buffer)
118
RZMASK =
CMASK & RMASK
119
NO
1st PASS ?
YES
120
ZTEST = bitwise-OR operation
of all RZMASK
for corresponding sub-block
122
Current image
covers all back layer?
YES
124
RMASK = 0
BMIN = MIN(CMIN, FMIN)
BMAX = MAX(CMAX, FMAX)
FMIN = MIN(CMIN, FMIN)
FMAX = MAX(CMAX, FMAX)
NO
128
RMASK = RMASK | CMASK
BMIN = BMIN
BMAX = BMAX
FMIN = MIN(CMIN, FMIN)
FMAX = MAX(CMAX, FMAX)
RETURN

Fig. 6E

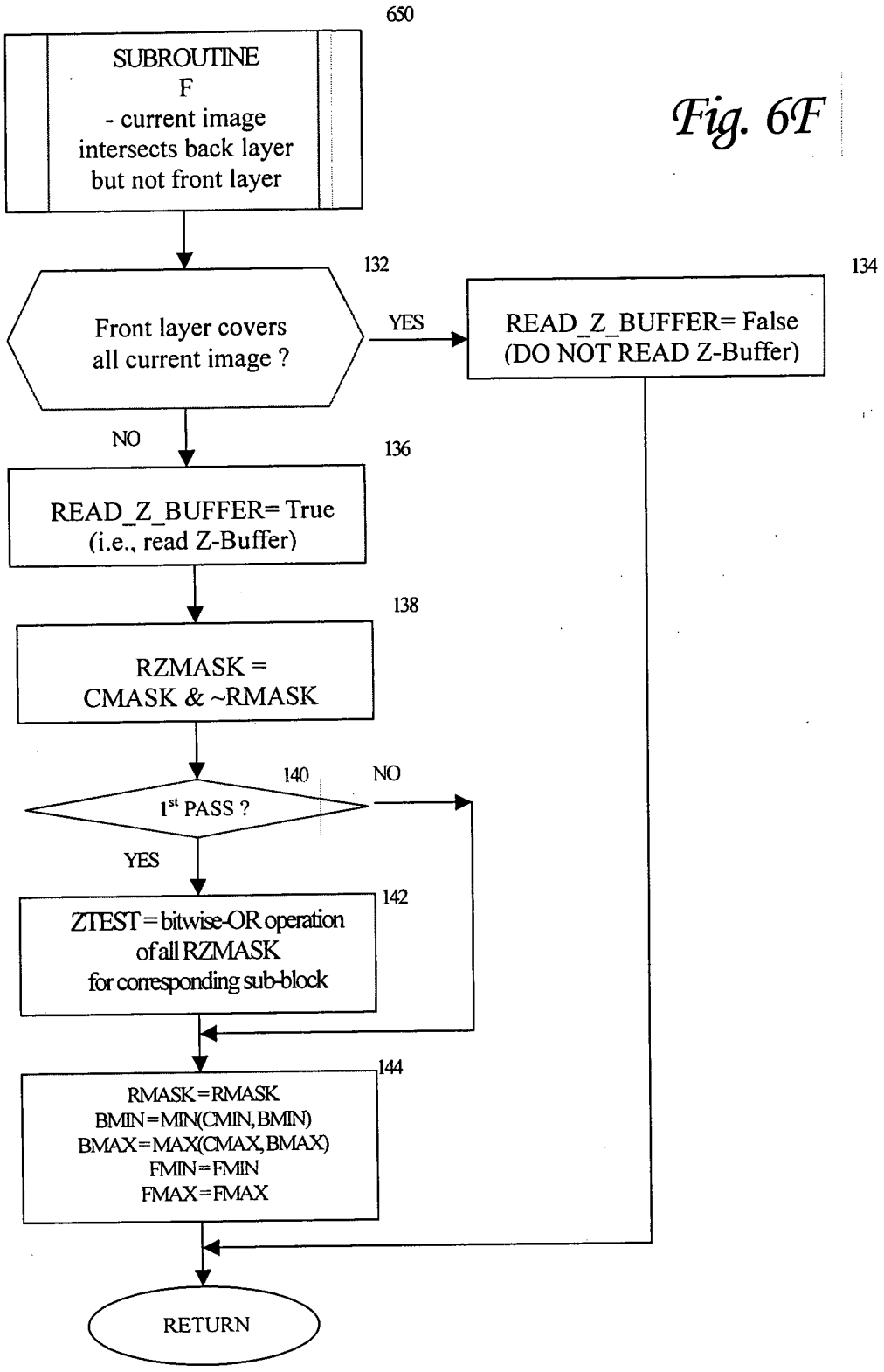

650
SUBROUTINE
F
- current image
intersects back layer
but not front layer
132
Front layer covers
all current image ?
YES
134
READ_Z_BUFFER= False
(DO NOT READ Z-Buffer)
NO
136
READ_Z_BUFFER= True
(i.e., read Z-Buffer)
138
RZMASK =
CMASK & ~RMASK
140
1st PASS ?
NO
YES
142
ZTEST = bitwise-OR operation
of all RZMASK
for corresponding sub-block
144
RMASK=RMASK
BMIN=MIN(CMIN,BMIN)
BMAX=MAX(CMAX,BMAX)
FMIN=FMIN
FMAX=FMAX
RETURN

Fig. 6F

600G

Z RANGER BUFFER SUBROUTINE

Fig. 6G

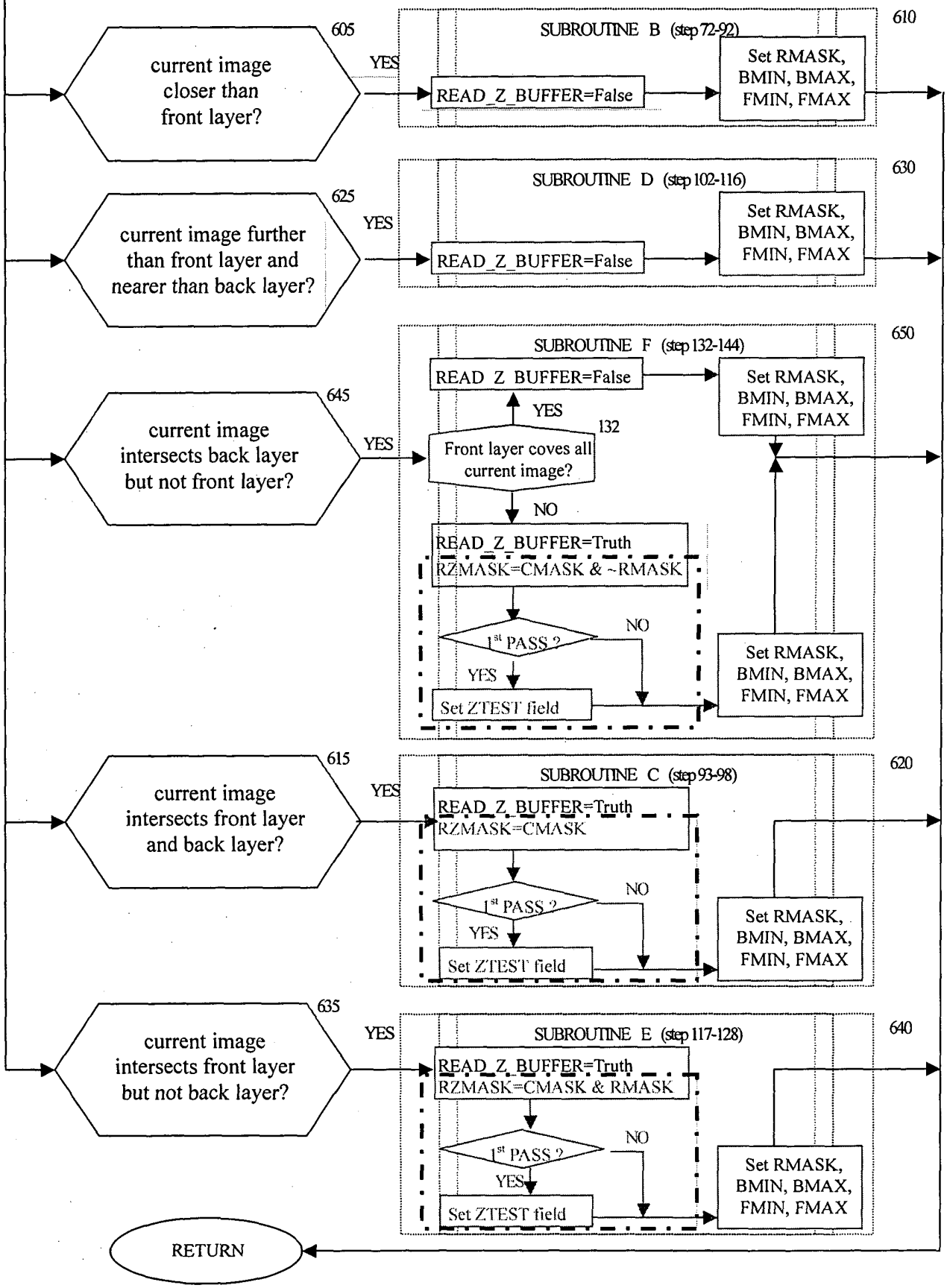


Fig. 7A

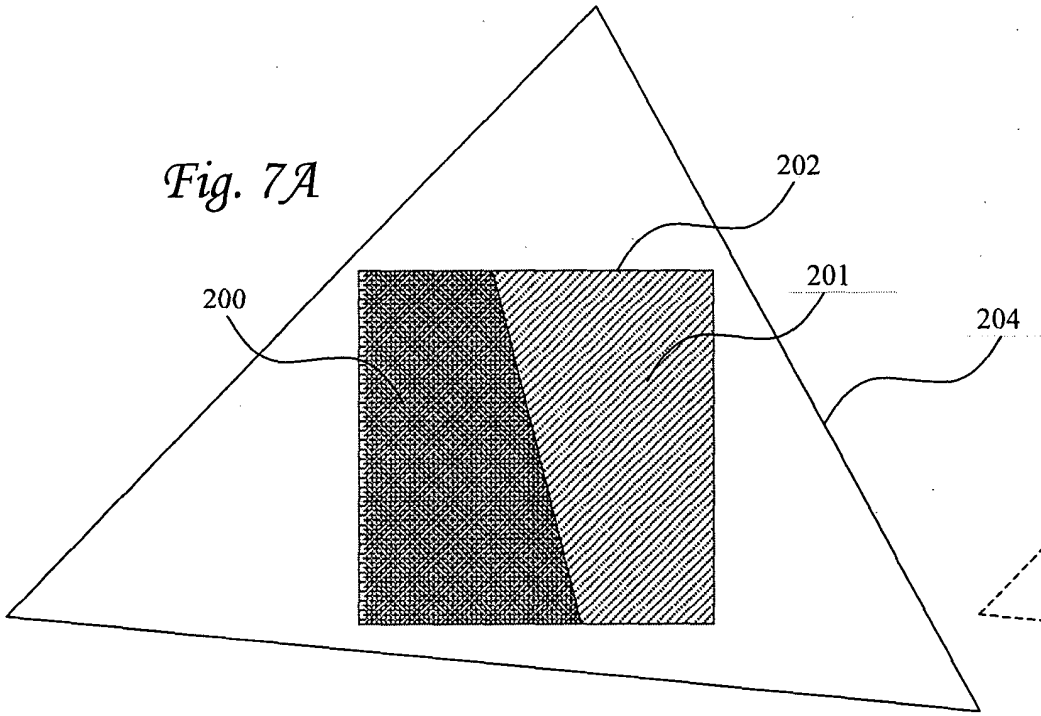


Fig. 7C

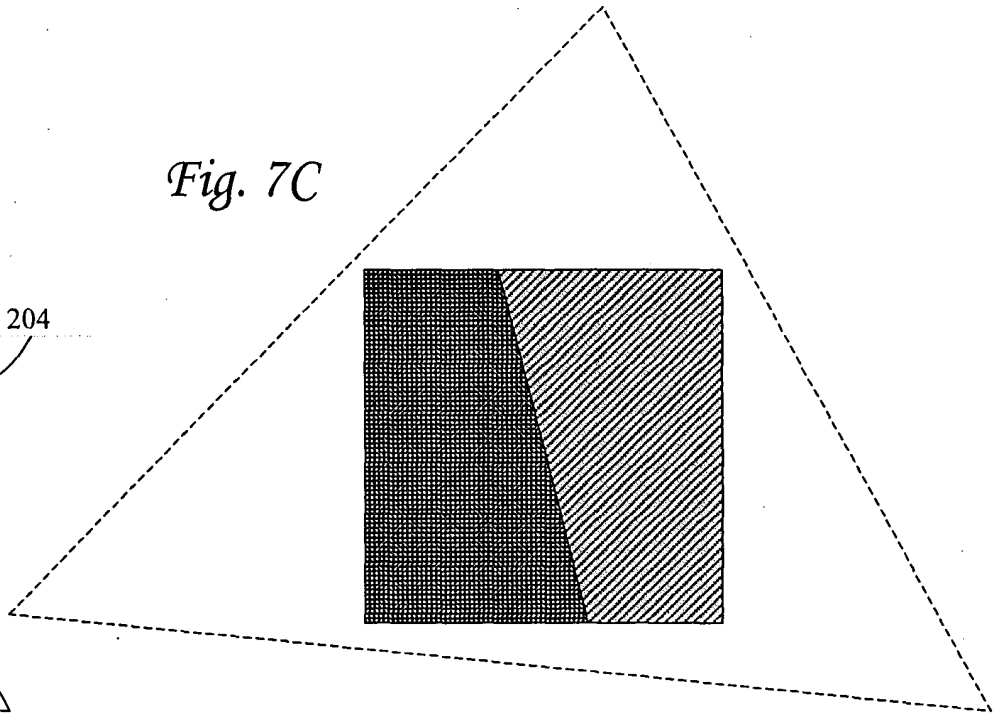


Fig. 7B

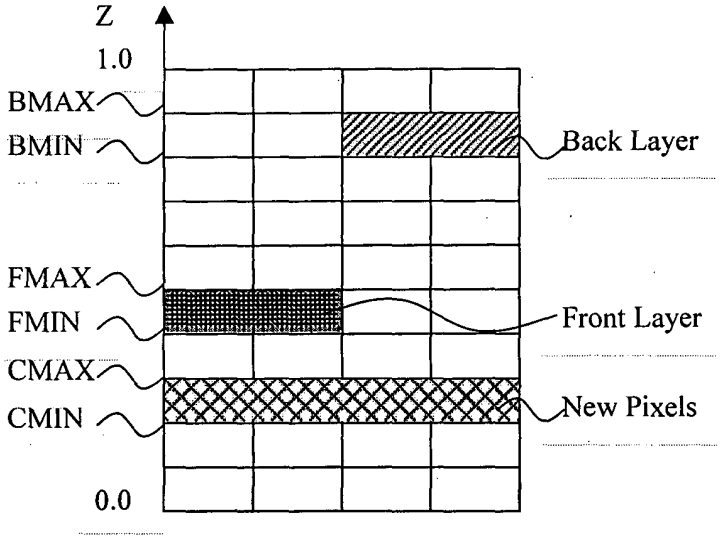


Fig. 7D

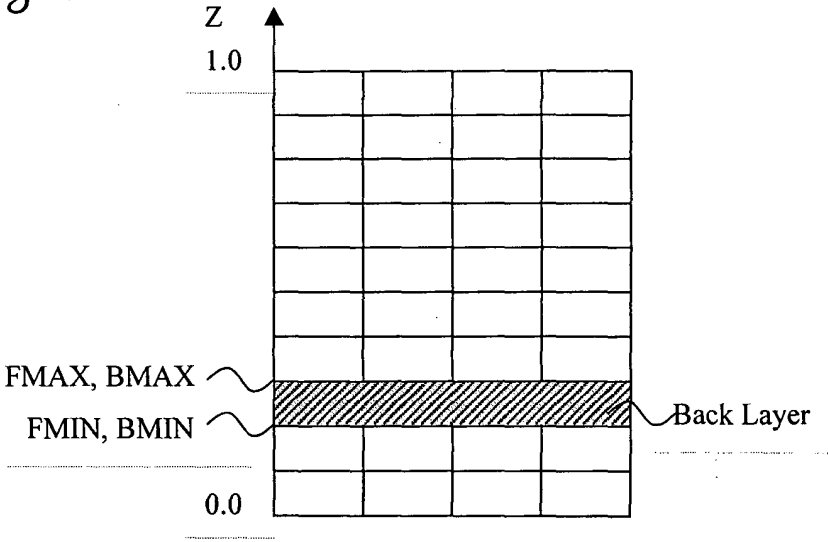


Fig. 8A

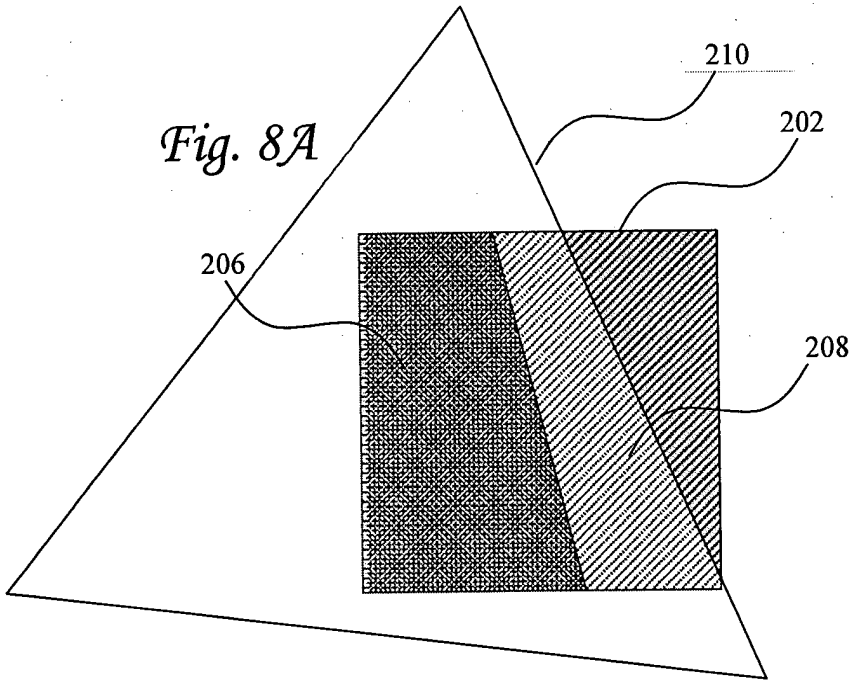


Fig. 8B

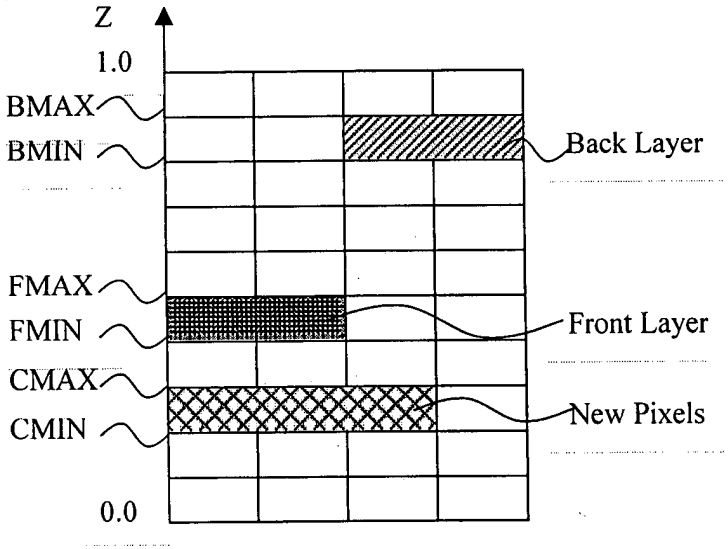


Fig. 8C

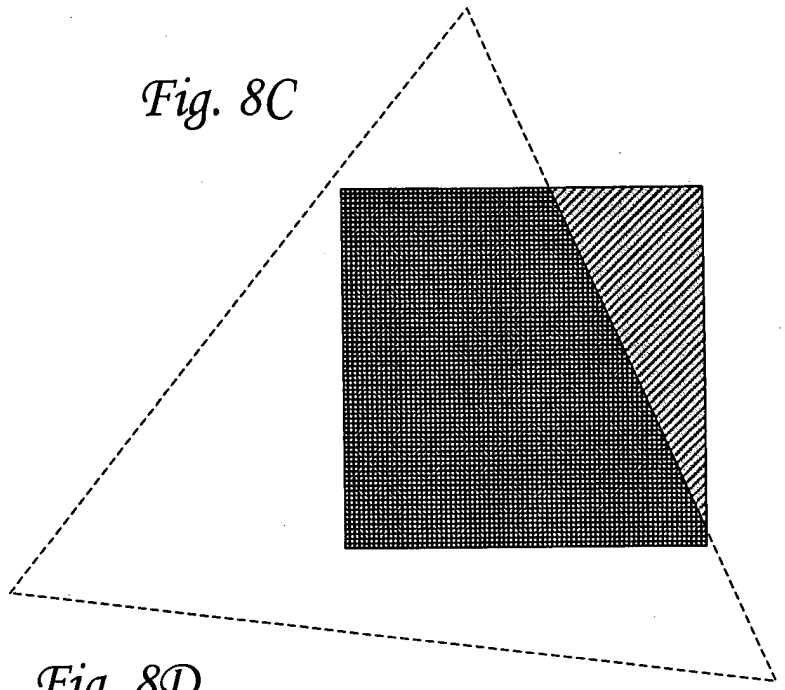


Fig. 8D

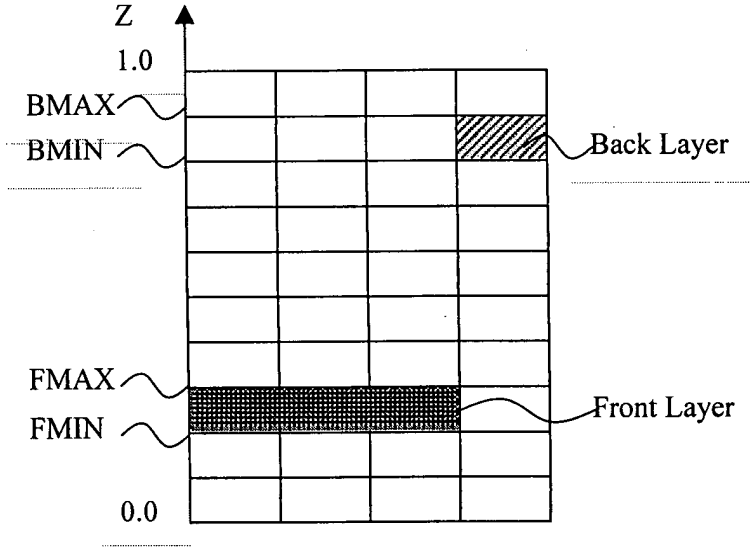


Fig. 9A

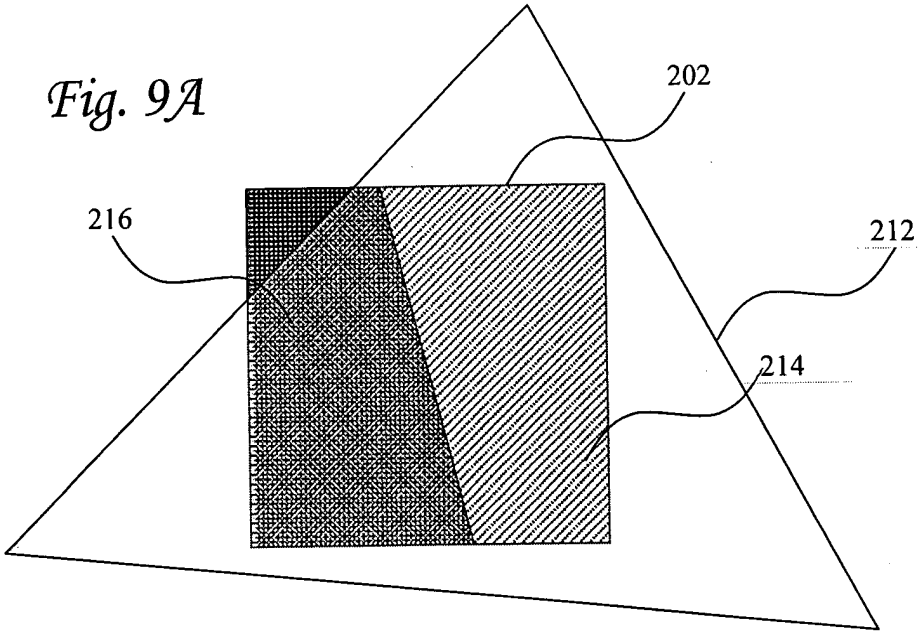


Fig. 9C

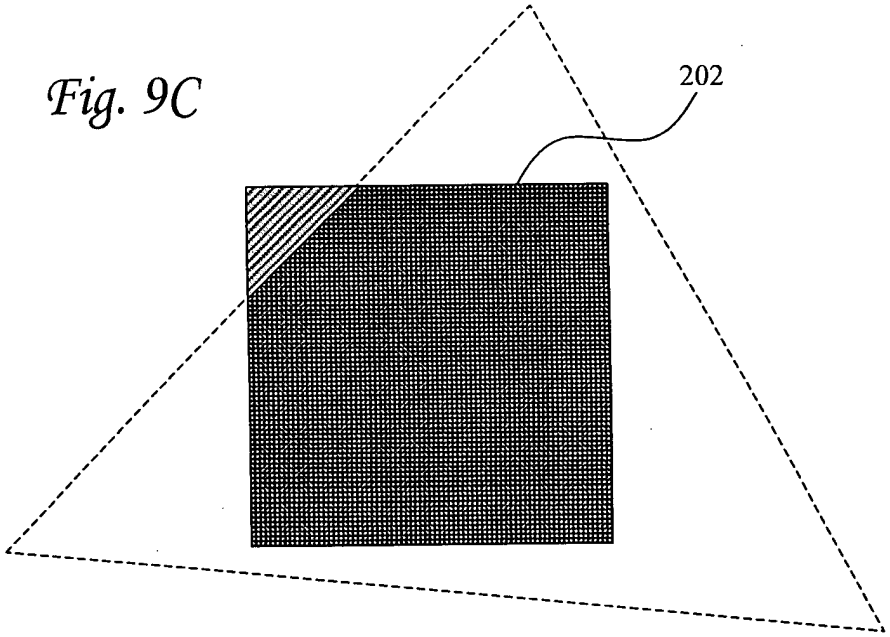


Fig. 9B

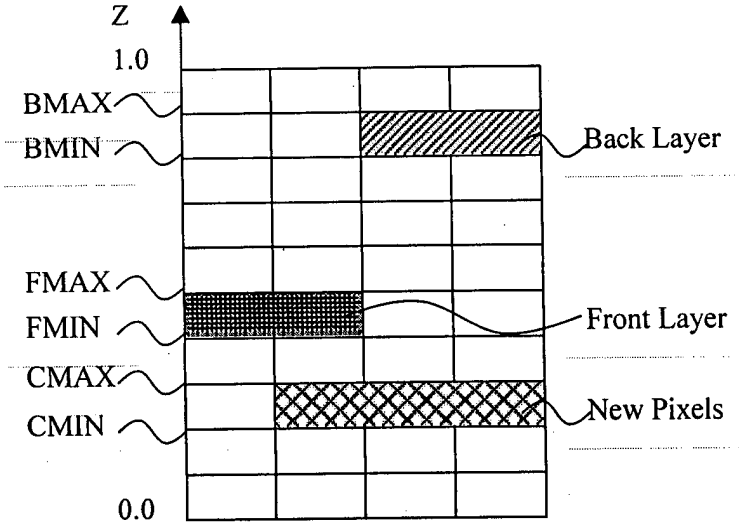


Fig. 9D

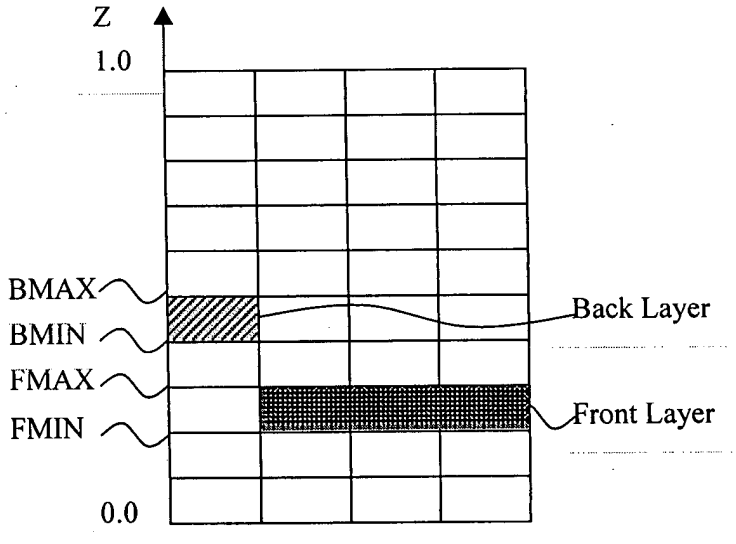


Fig. 10A

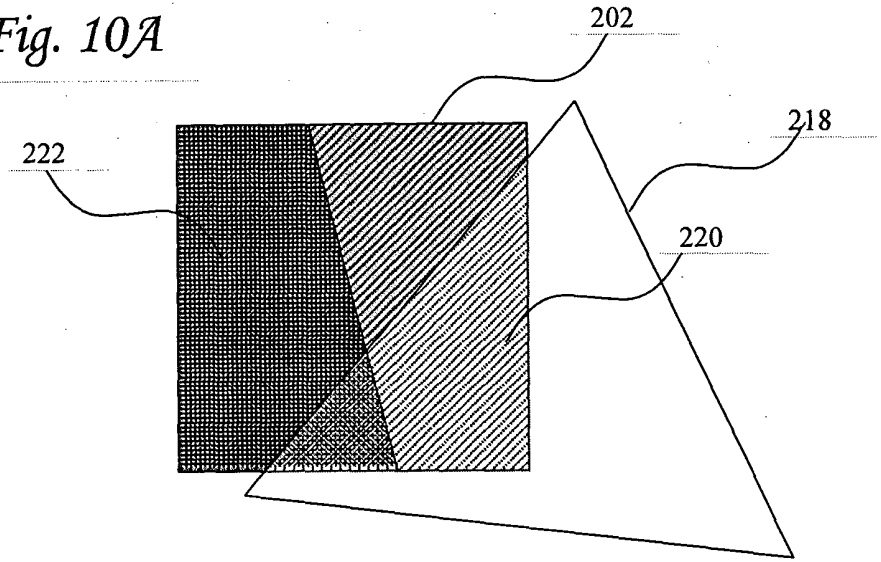


Fig. 10C

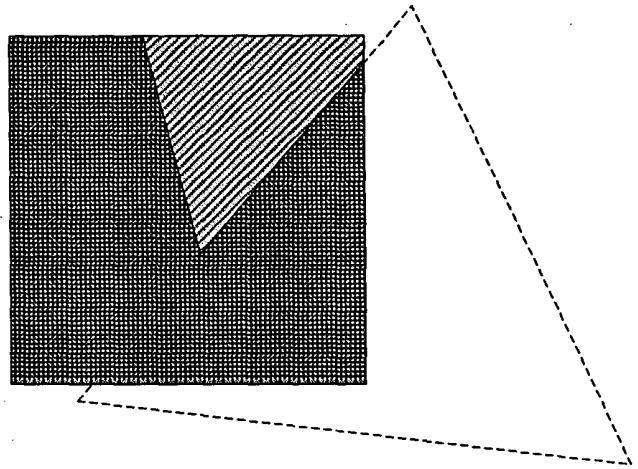


Fig. 10B

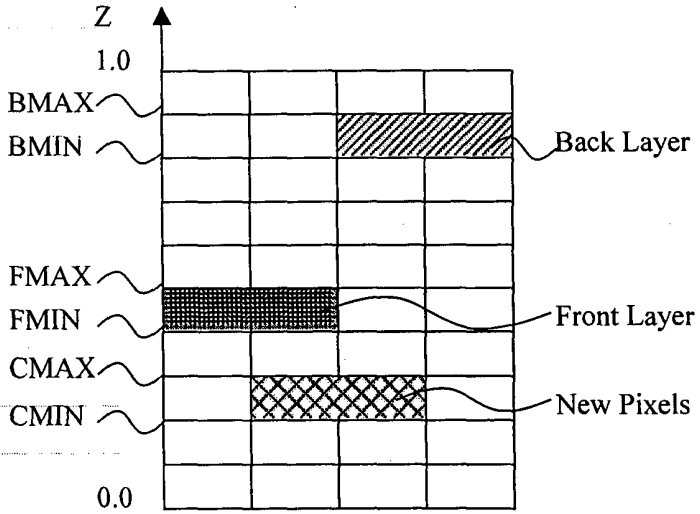
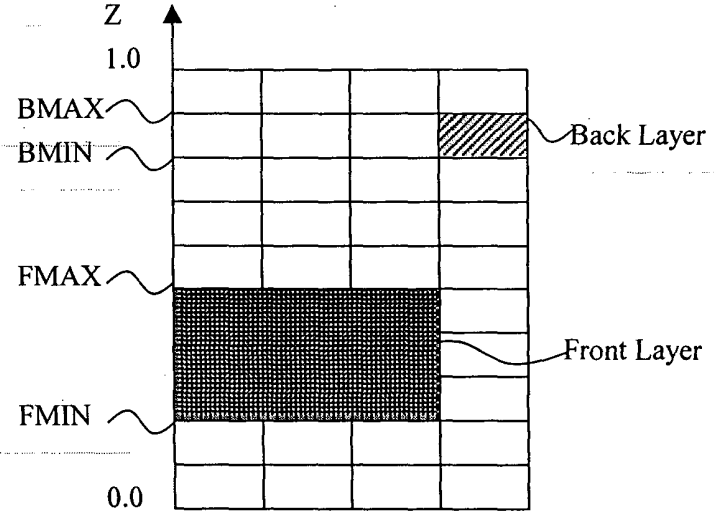


Fig. 10D



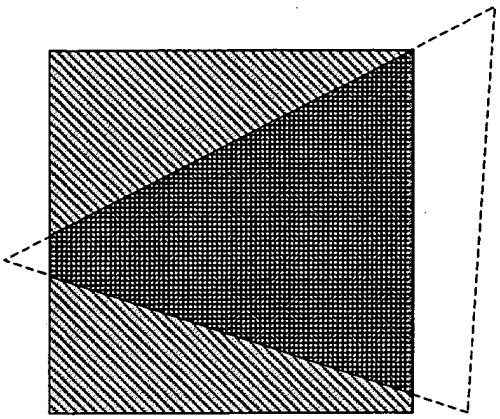


Fig. 10G

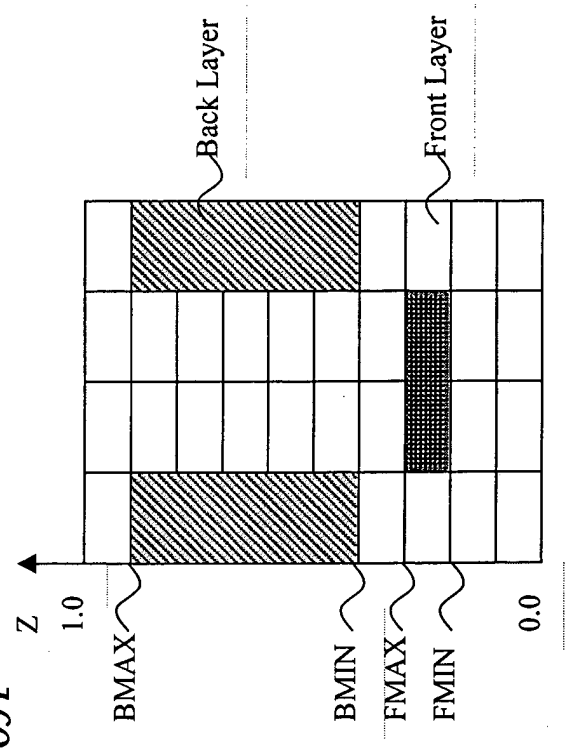


Fig. 10H

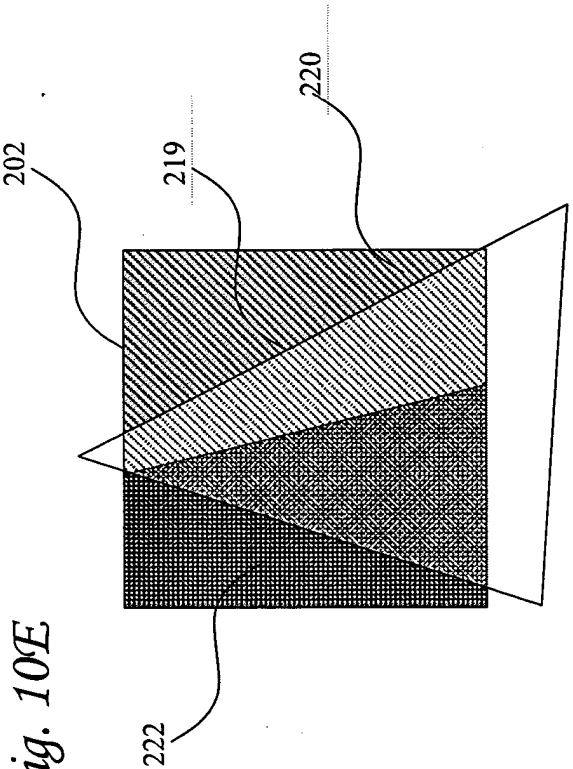


Fig. 10E

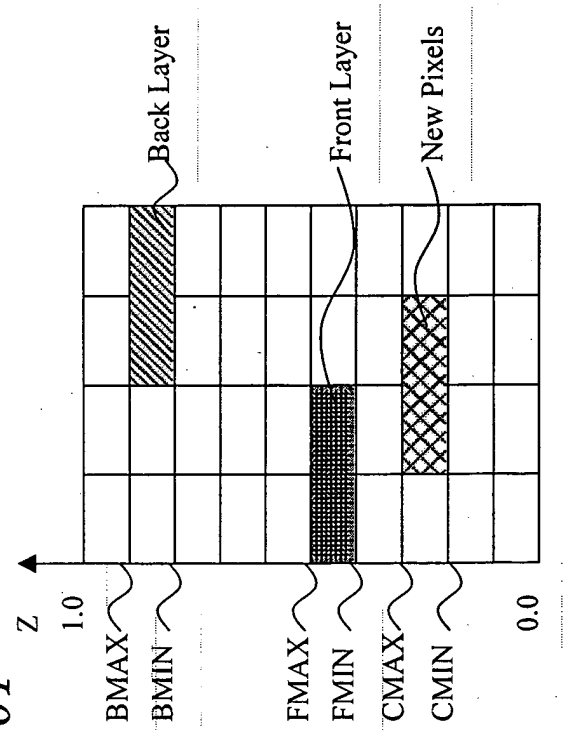


Fig. 10F

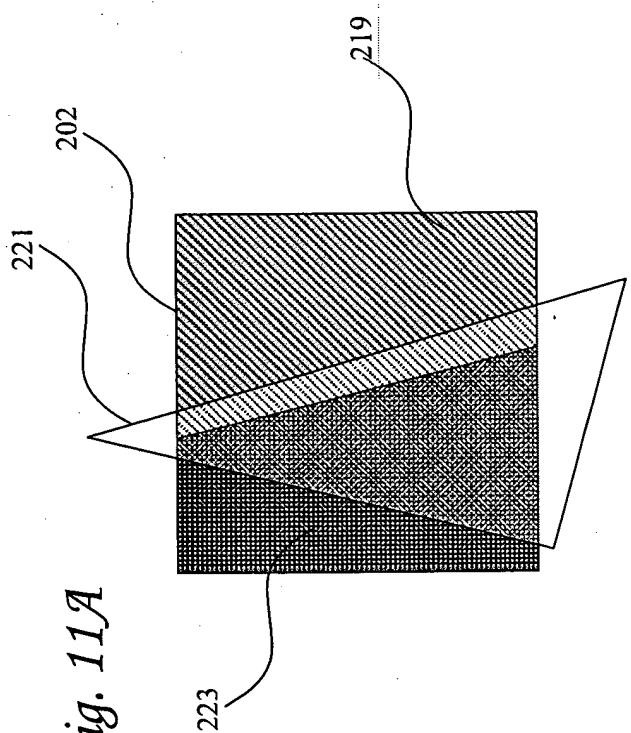


Fig. 11A

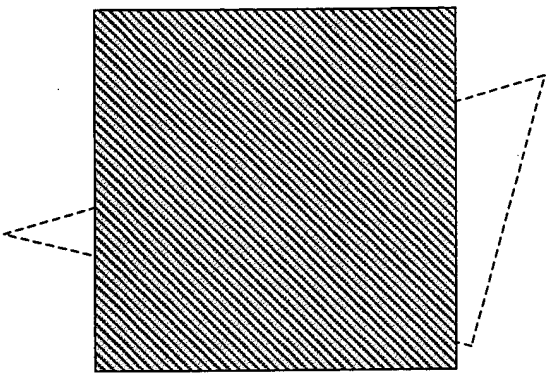


Fig. 11C

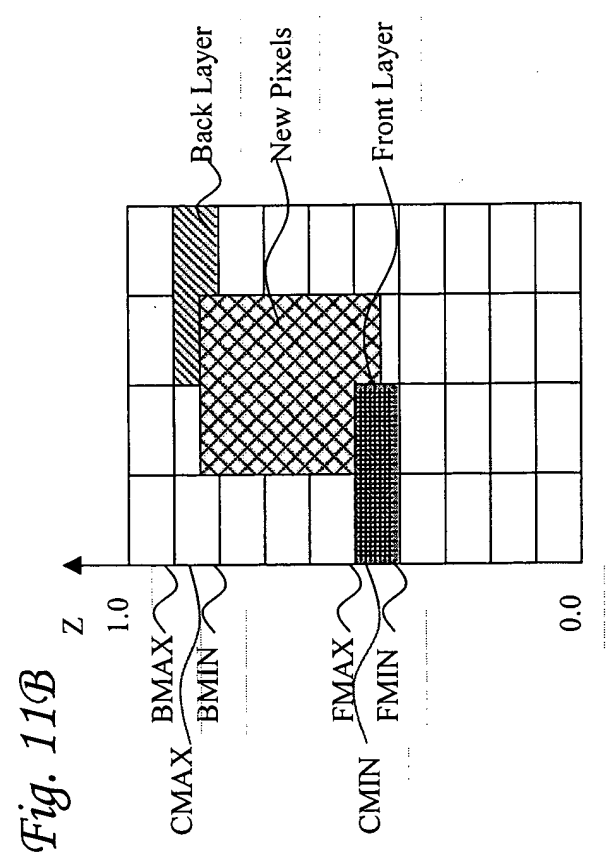


Fig. 11B

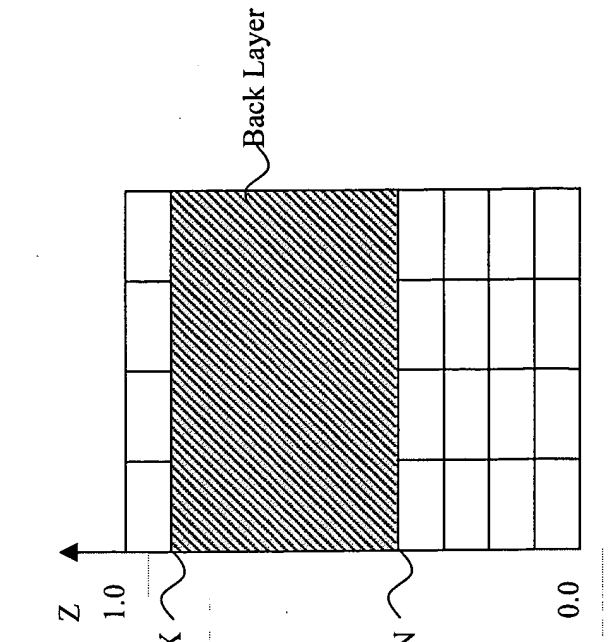


Fig. 11D

Fig. 12A

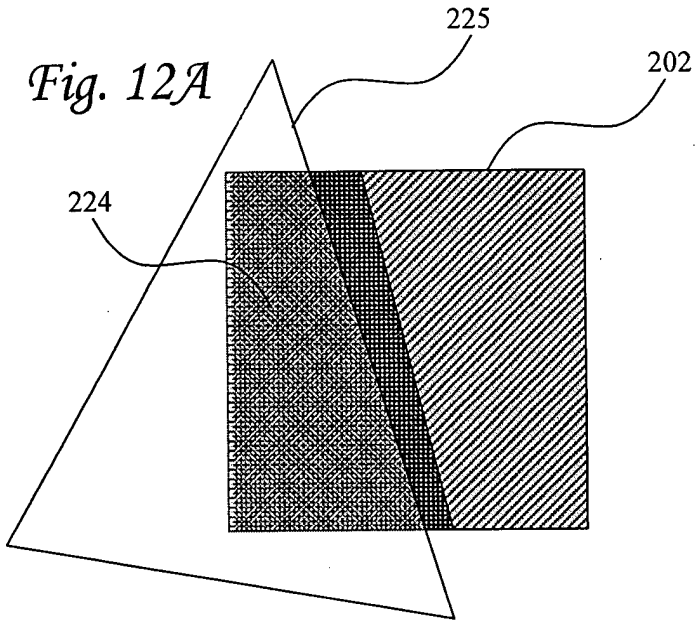


Fig. 12B

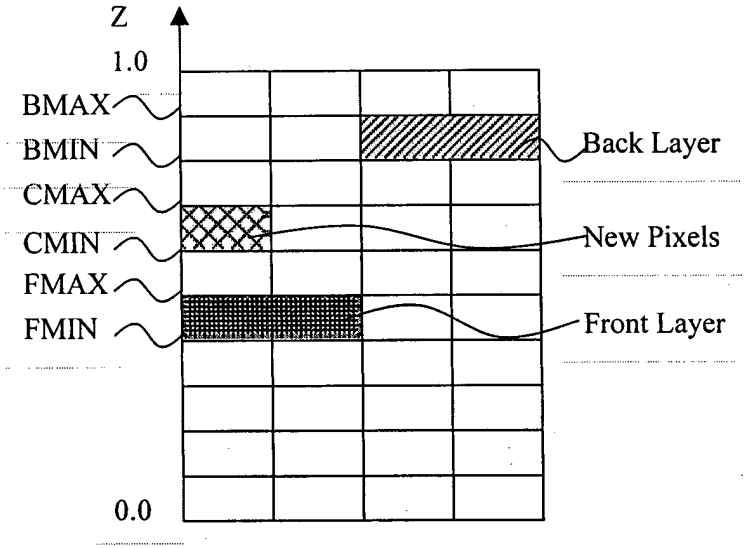


Fig. 12C

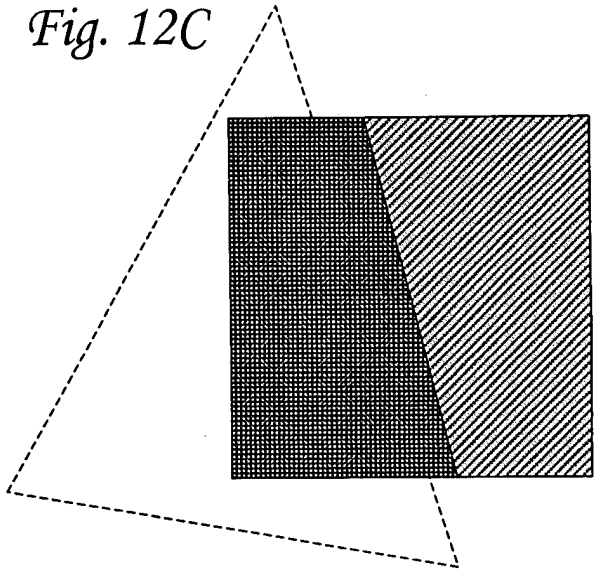


Fig. 12D

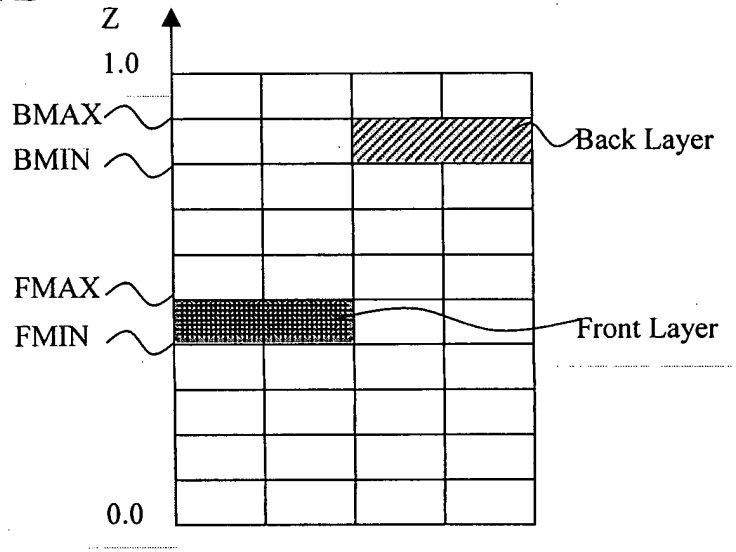


Fig. 13A

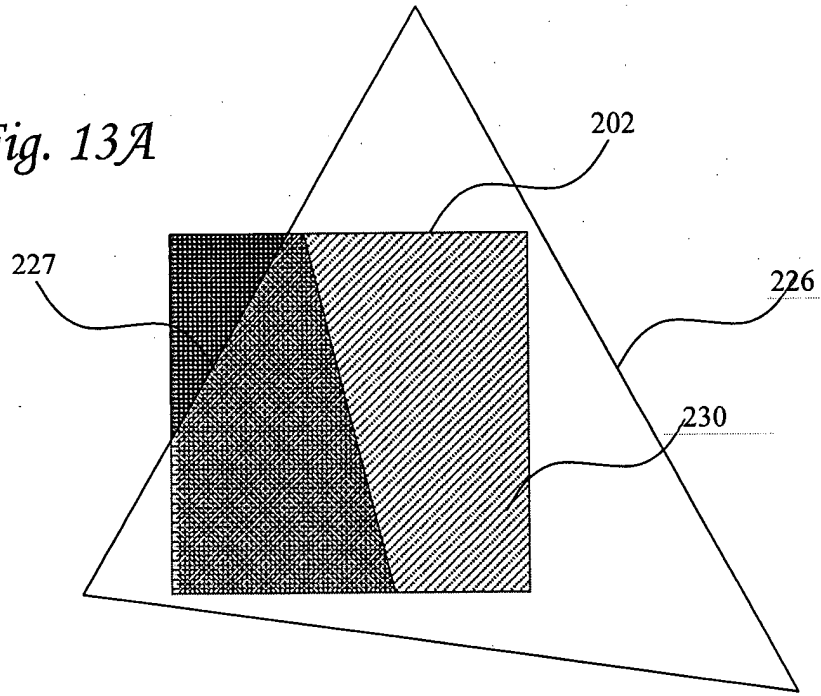


Fig. 13C

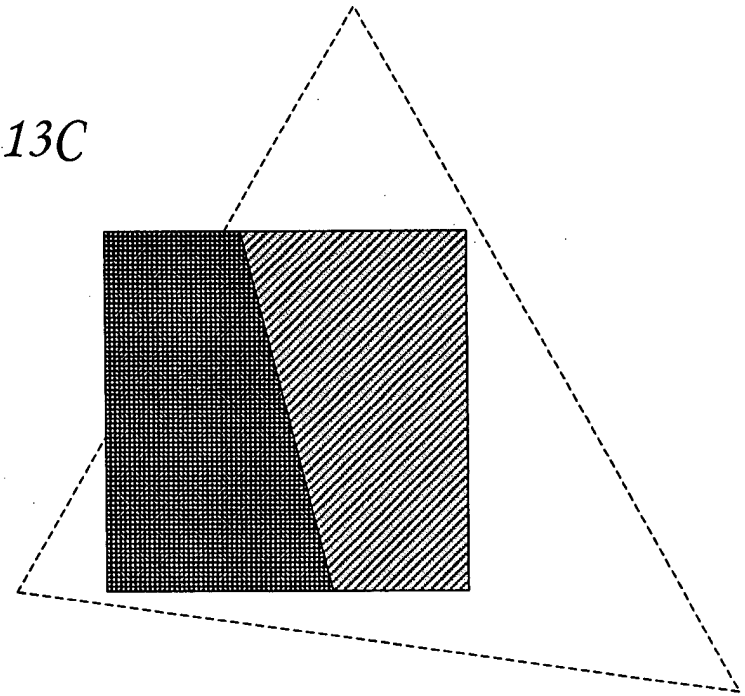


Fig. 13B

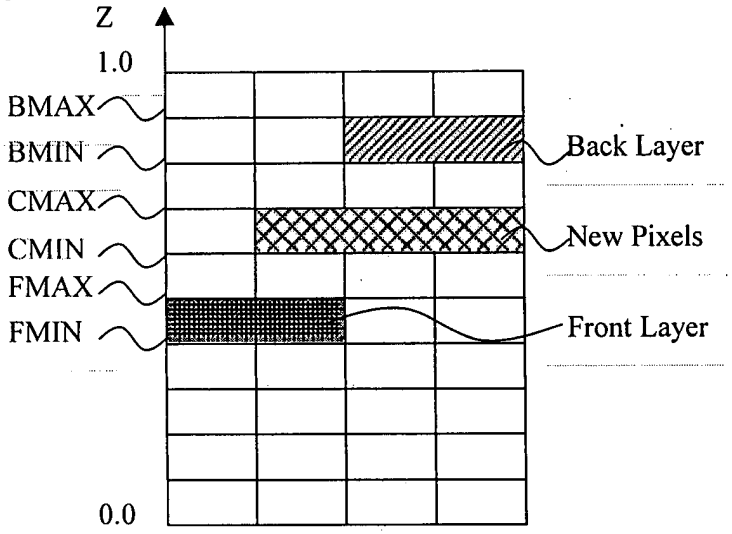
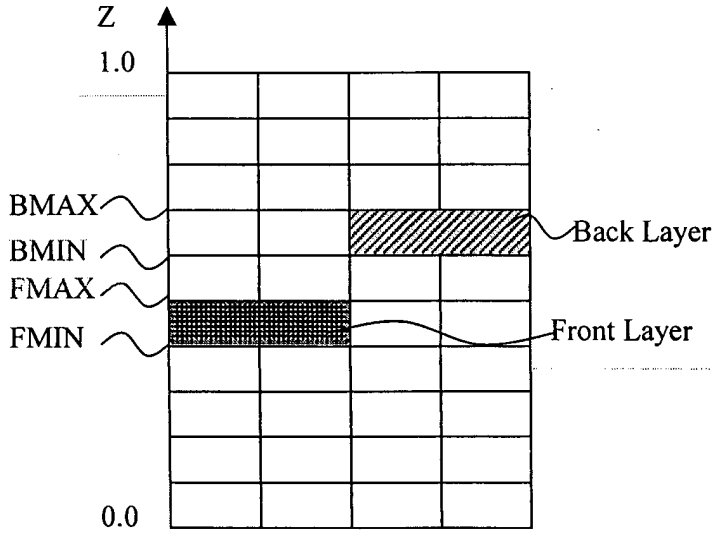


Fig. 13D



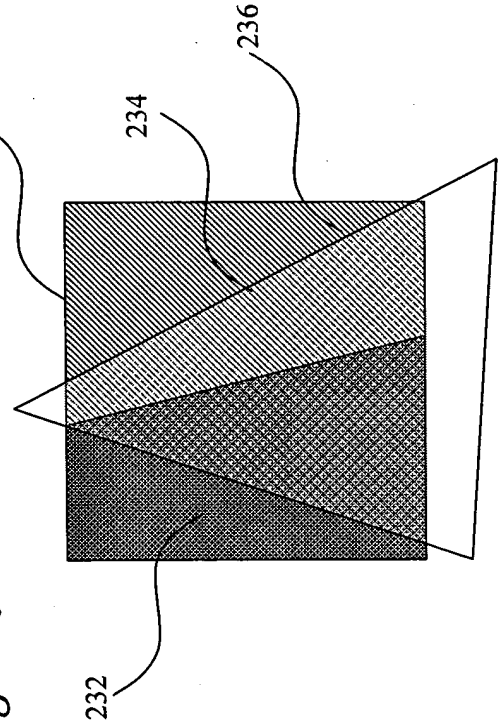


Fig. 14A

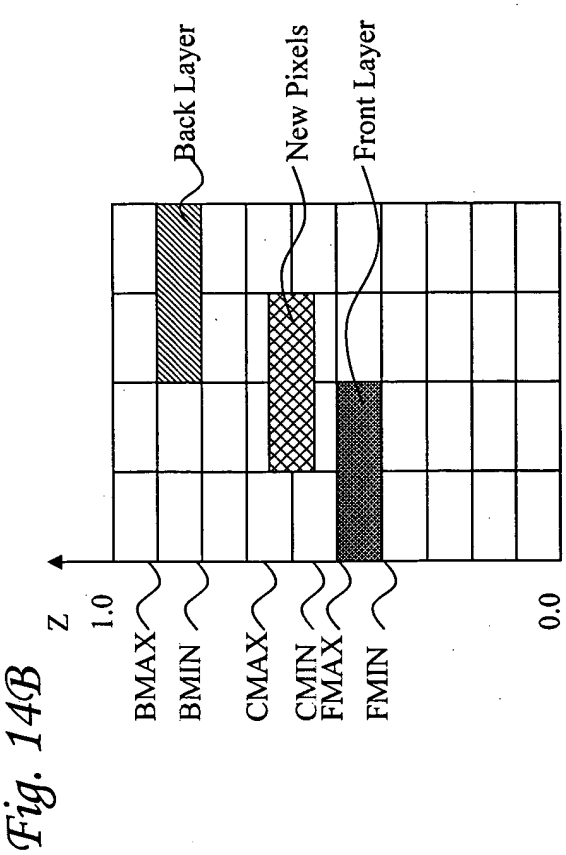


Fig. 14B

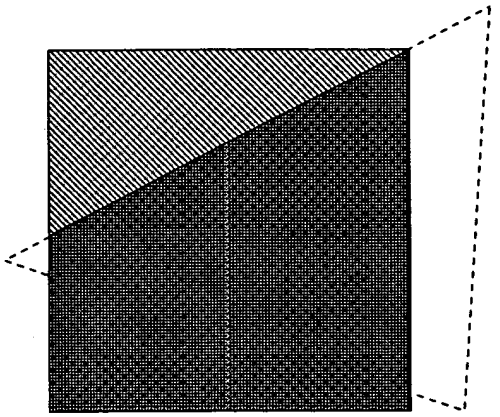


Fig. 14C

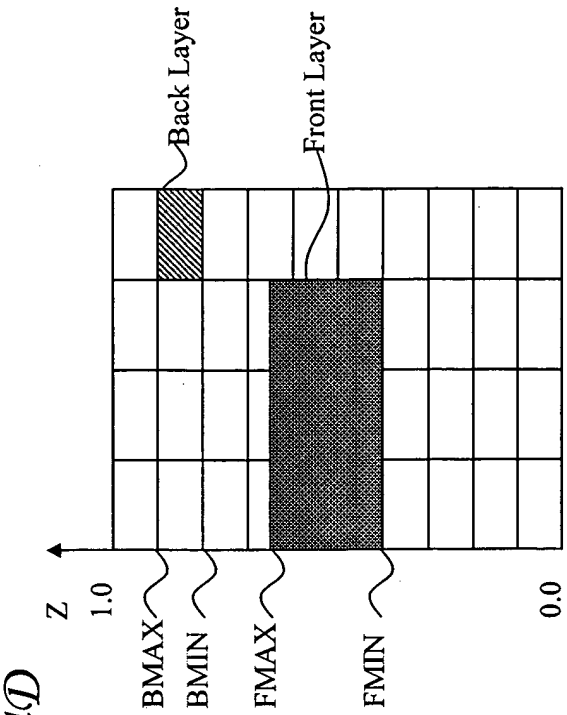


Fig. 14D

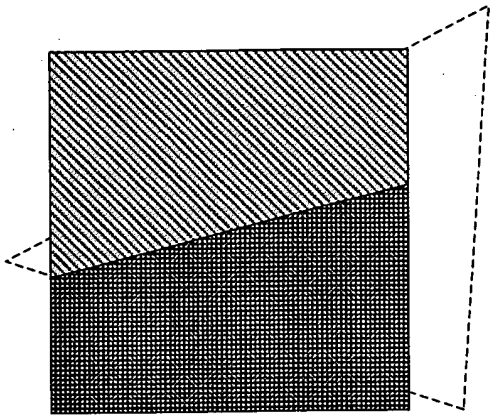


Fig. 14G

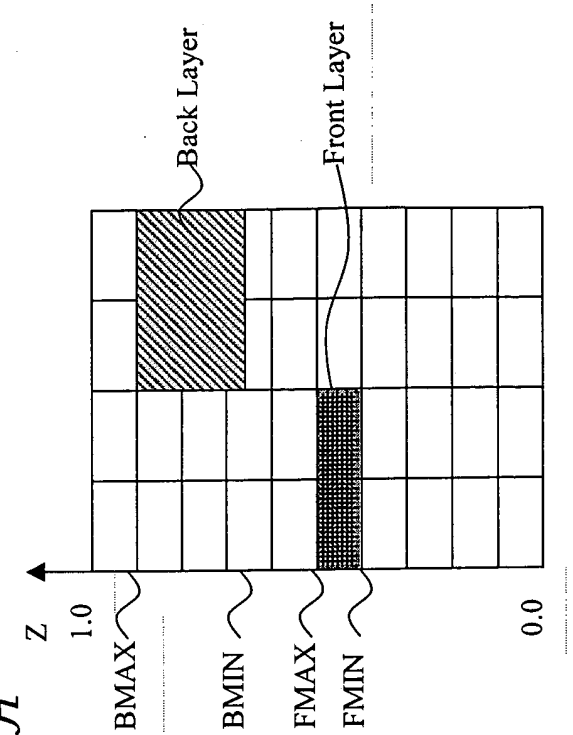


Fig. 14H

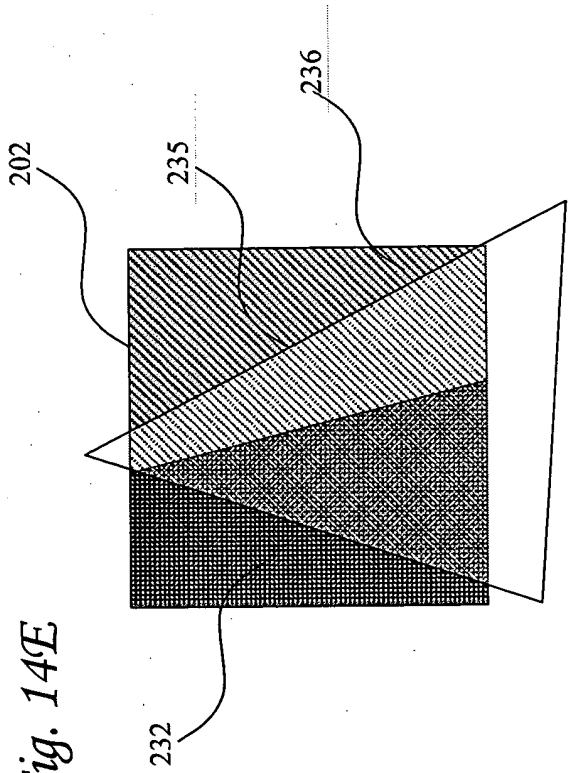


Fig. 14E

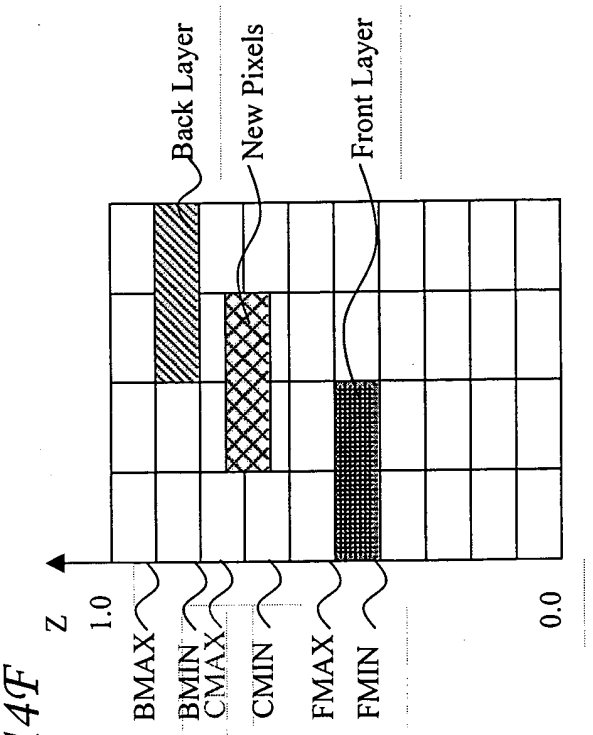


Fig. 14F

Fig. 15A

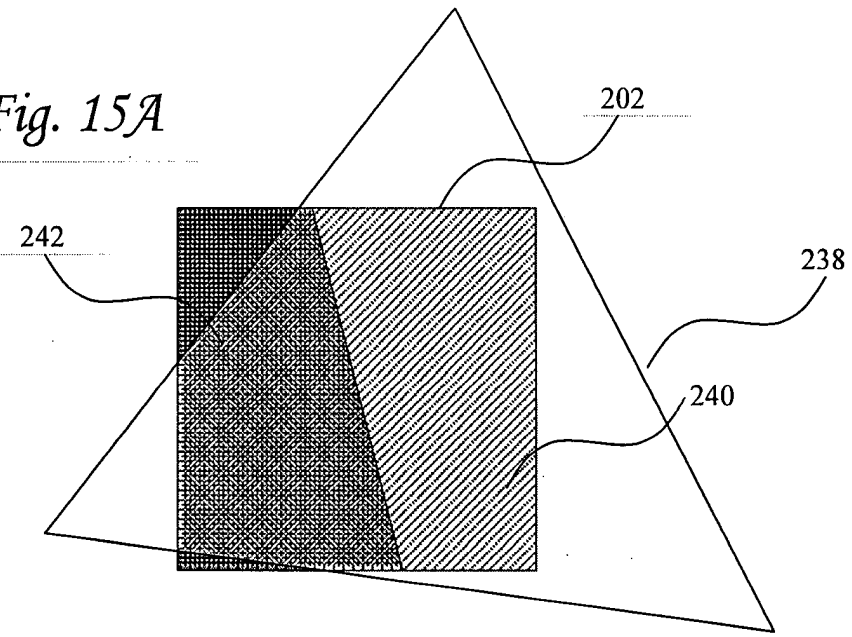


Fig. 15C

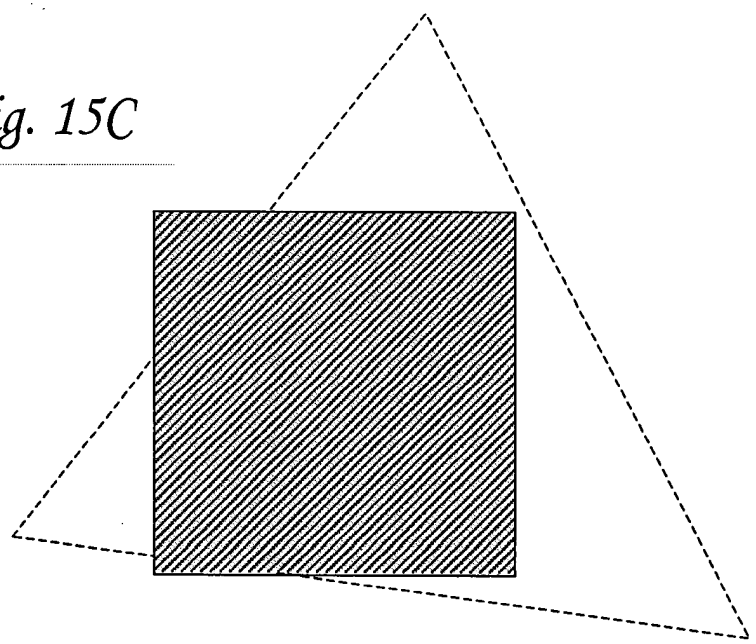


Fig. 15B

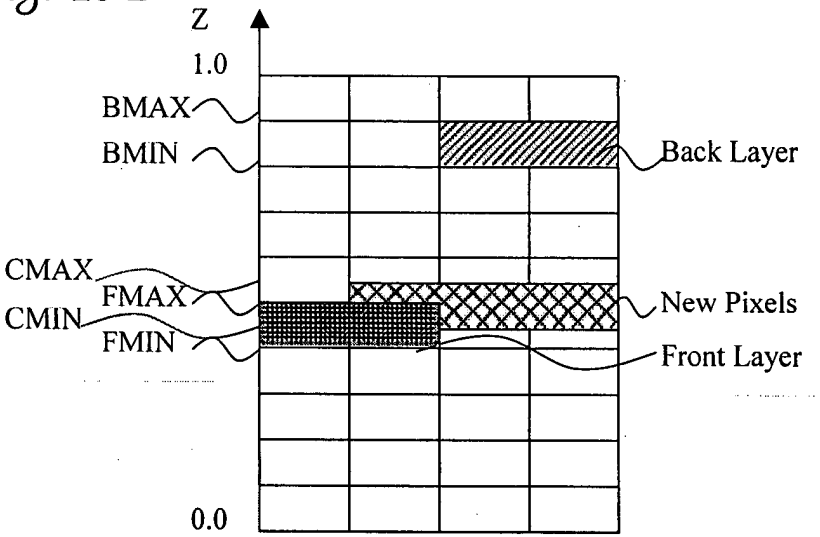
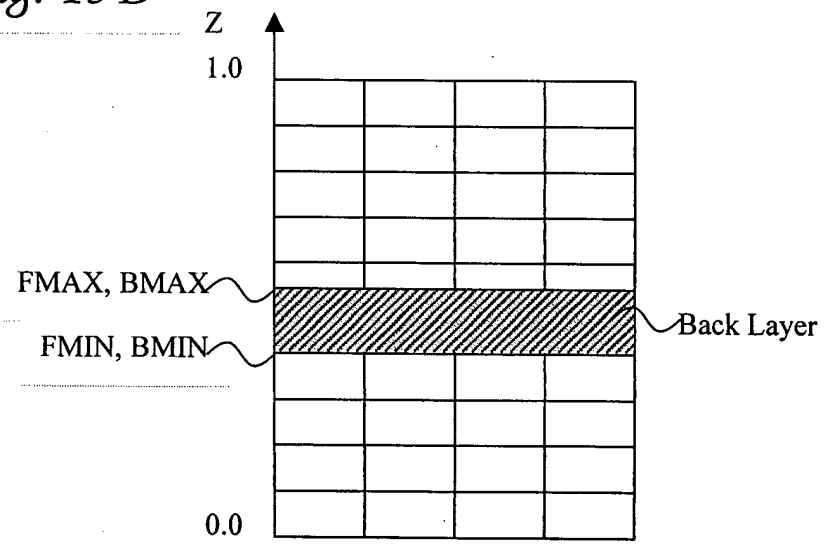


Fig. 15D



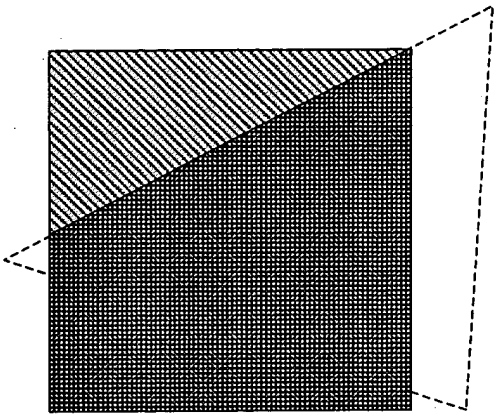


Fig. 15G

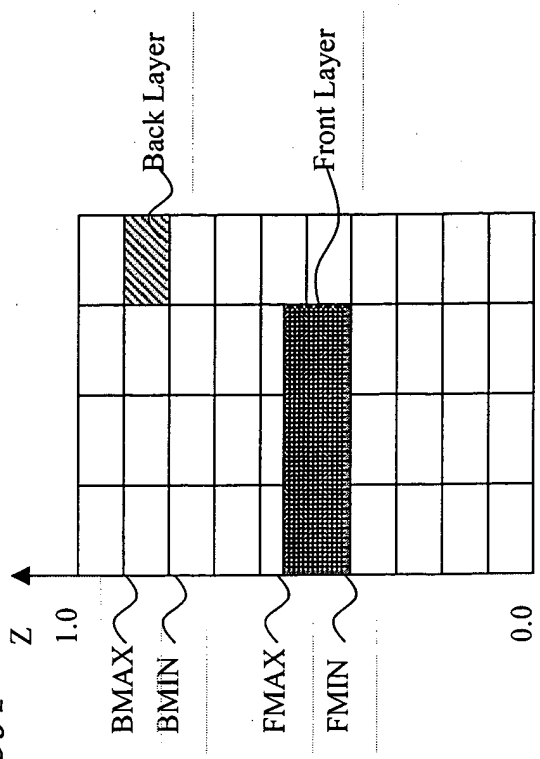


Fig. 15H

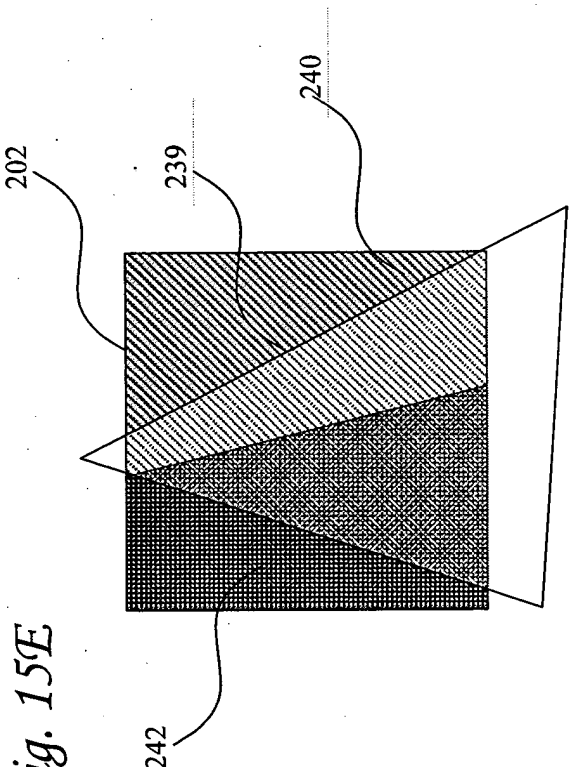


Fig. 15E

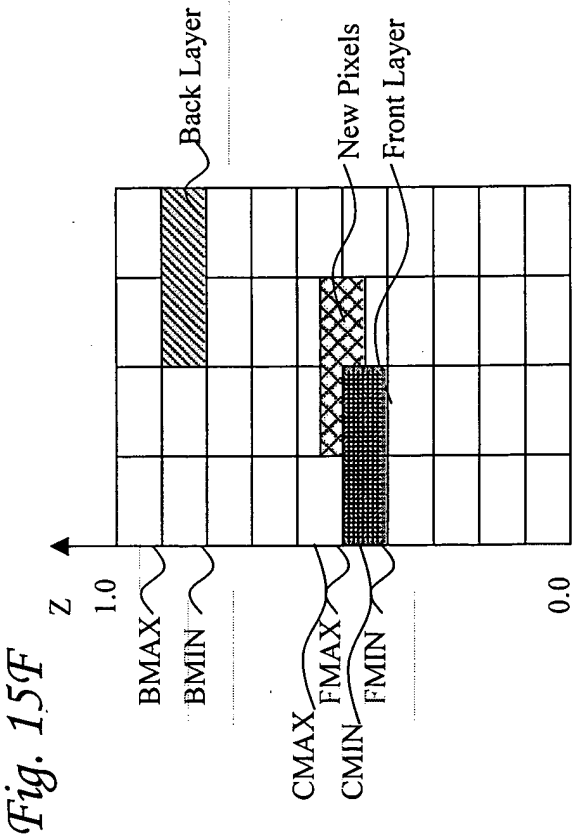


Fig. 15F

Fig. 16A

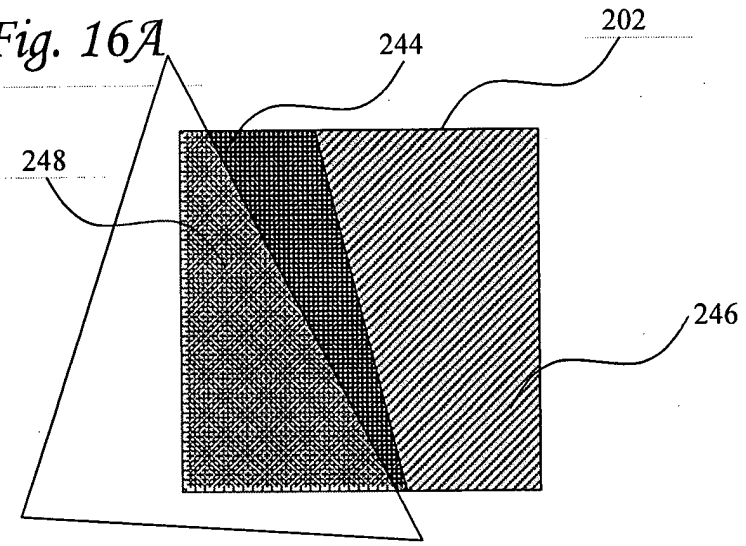


Fig. 16C

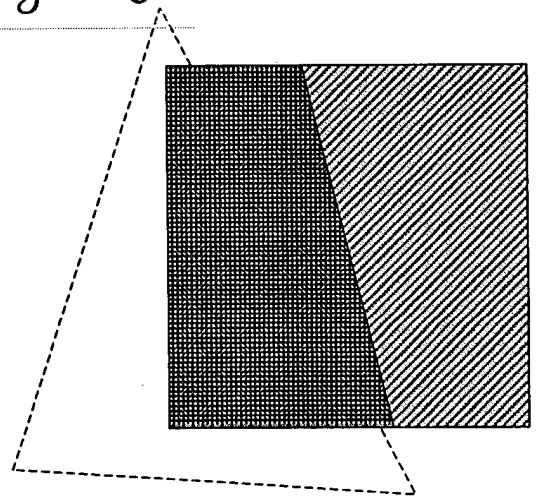


Fig. 16B

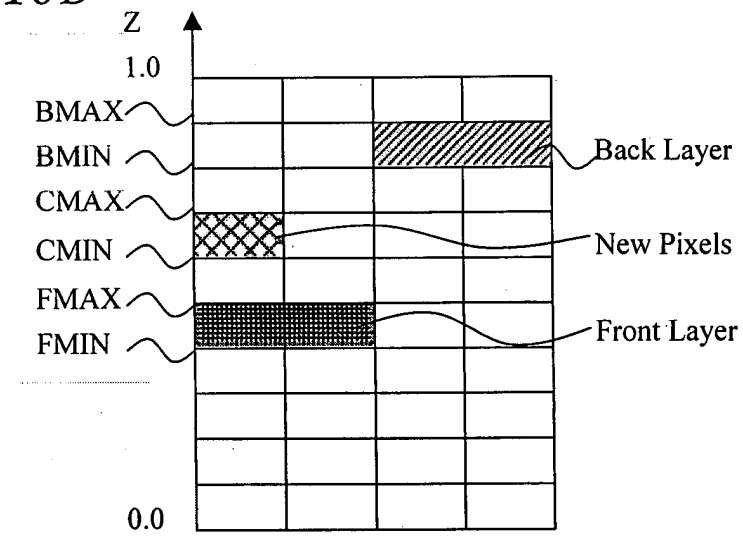
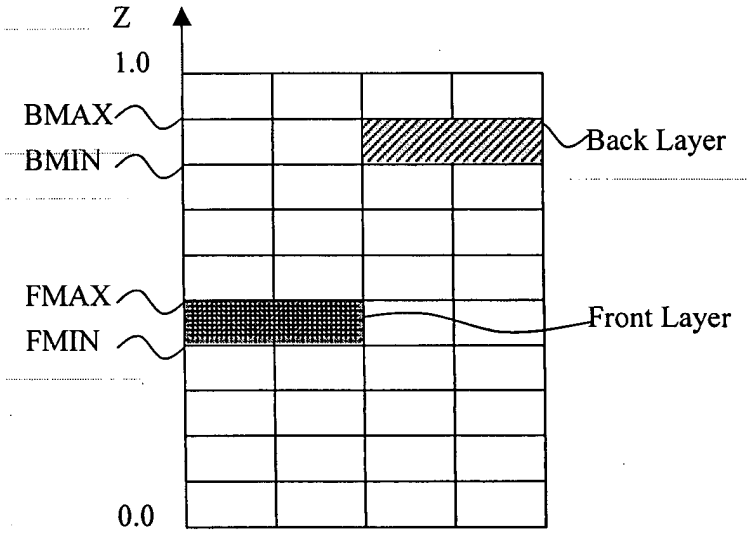


Fig. 16D



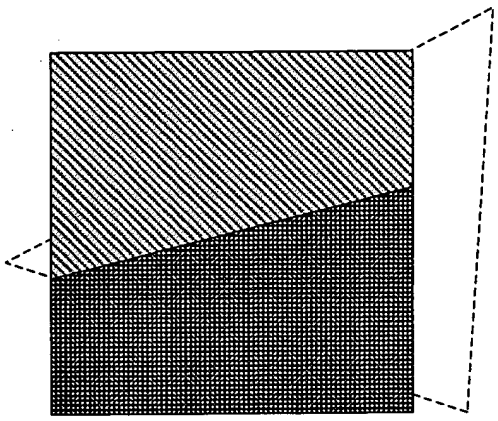


Fig. 16G

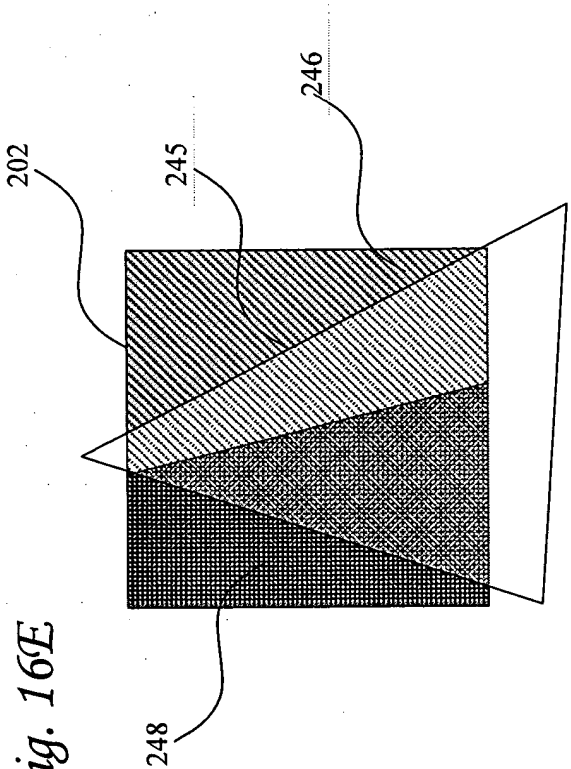


Fig. 16E

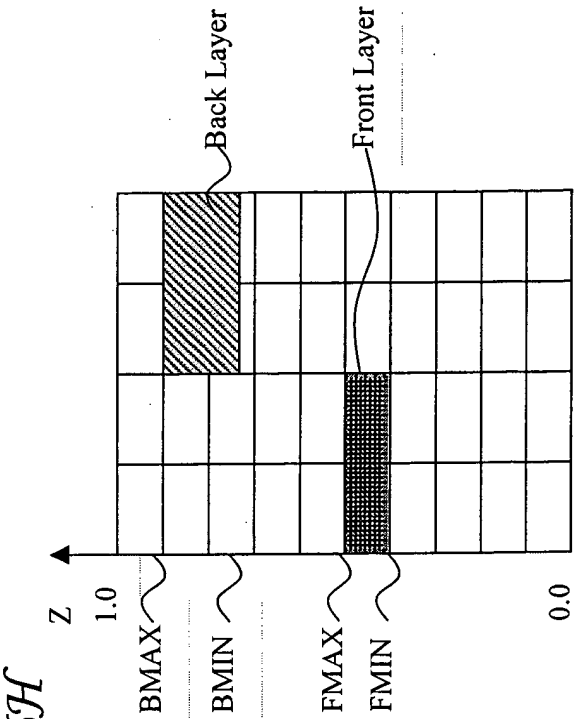


Fig. 16H

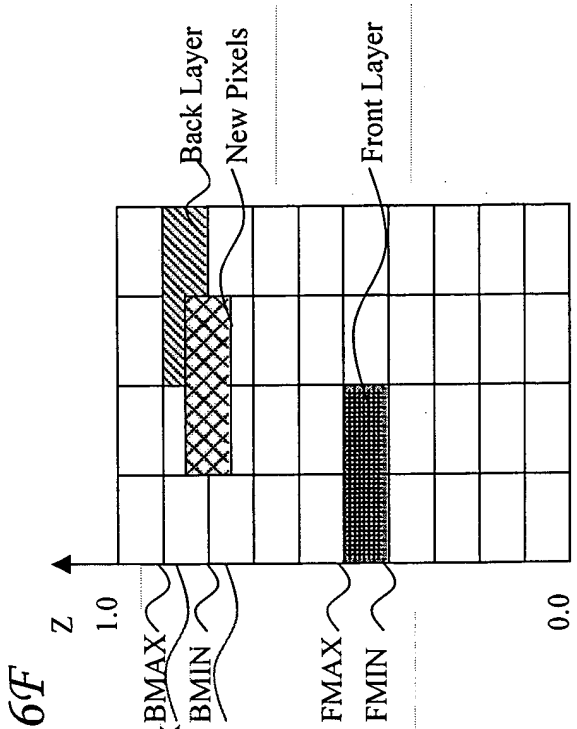


Fig. 16F

Fig. 17A

RMASK for an 8x8 display block 202

SUB-BLOCK 0 →

SUB-BLOCK 1 →

SUB-BLOCK 2 →

SUB-BLOCK 3 →

1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0

Fig. 17B

CMASK for a current triangle 221

0	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0
0	1	1	1	0	0	0	0
0	1	1	1	1	0	0	0
1	1	1	1	1	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Fig. 17C

RZMASK = CMASK

Correspond to SUB-BLOCK 0 → ZTEST[0]=[1]

Correspond to SUB-BLOCK 1 → ZTEST[1]=[1]

Correspond to SUB-BLOCK 2 → ZTEST[2]=[1]

Correspond to SUB-BLOCK 3 → ZTEST[3]=[0]

0	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0
0	1	1	1	0	0	0	0
0	1	1	1	1	0	0	0
1	1	1	1	1	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

=> ZTEST[0..3]=[1110]

Fig. 18A

RMASK for an 8x8 display block 202

SUB-BLOCK 0 →

SUB-BLOCK 1 →

SUB-BLOCK 2 →

SUB-BLOCK 3 →

1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0

Fig. 18B

CMASK for a current triangle 238

0	0	0	1	1	1	1	1
0	0	0	1	1	1	1	1
0	0	1	1	1	1	1	1
0	0	1	1	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1

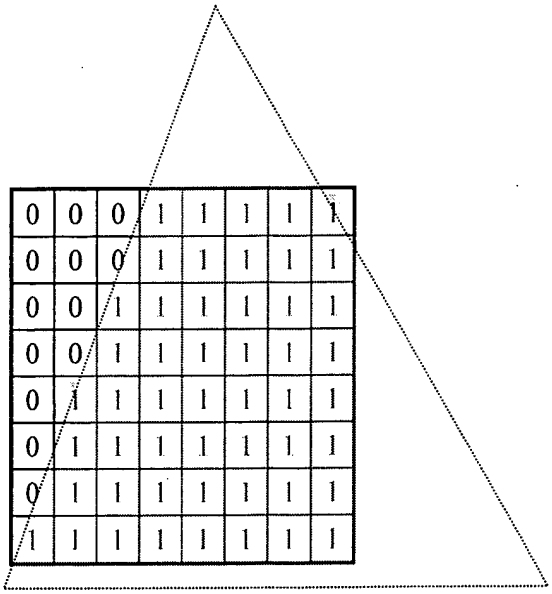


Fig. 18C

RZMASK = CMASK & RMASK

Correspond to SUB-BLOCK 0 → ZTEST[0]=[0]

Correspond to SUB-BLOCK 1 → ZTEST[1]=[1]

Correspond to SUB-BLOCK 2 → ZTEST[2]=[1]

Correspond to SUB-BLOCK 3 → ZTEST[3]=[1]

0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	1	1	0	0	0	0
0	1	1	1	1	0	0	0
0	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0

=> ZTEST[0..3]=[0111]

Fig. 19A

RMASK for an 8x8 display block 202

SUB-BLOCK 0 →

SUB-BLOCK 1 →

SUB-BLOCK 2 →

SUB-BLOCK 3 →

1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0

Fig. 19B

CMASK for a current triangle 250

0	0	0	1	0	0	0	0
0	0	1	1	1	0	0	0
0	0	1	1	1	0	0	0
0	0	1	1	1	1	0	0
0	1	1	1	1	1	0	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
1	1	1	1	1	1	1	1

Fig. 19C

RZMASK = CMASK & ~RMASK

Correspond to SUB-BLOCK 0 → ZTEST[0]=[1]

Correspond to SUB-BLOCK 1 → ZTEST[1]=[1]

Correspond to SUB-BLOCK 2 → ZTEST[2]=[1]

Correspond to SUB-BLOCK 3 → ZTEST[3]=[1]

0	0	0	1	0	0	0	0
0	0	0	1	1	0	0	0
0	0	0	1	1	0	0	0
0	0	0	0	1	1	0	0
0	0	0	0	1	1	0	0
0	0	0	0	0	1	1	0
0	0	0	0	0	1	1	0
0	0	0	0	0	1	1	1

=> ZTEST[0..3]=[1111]

Fig. 20A

RMASK for an 8x8 display block 202

1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	0	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
1	1	1	1	1	0	0	0
SB0'		SB1'		SB2'		SB3'	

Fig. 20B

CMASK for a current triangle 250

0	0	0	1	0	0	0	0
0	0	1	1	1	0	0	0
0	0	1	1	1	0	0	0
0	0	1	1	1	1	0	0
0	1	1	1	1	1	0	0
0	1	1	1	1	1	1	0
0	1	1	1	1	1	1	0
1	1	1	1	1	1	1	1

Fig. 20C

RZMASK = CMASK & ~RMASK

Correspond to SUB-BLOCK 0' → ZTEST[0]=[0]

Correspond to SUB-BLOCK 1' → ZTEST[1]=[1]

Correspond to SUB-BLOCK 2' → ZTEST[2]=[1]

Correspond to SUB-BLOCK 3' → ZTEST[3]=[1]

=> ZTEST[0..3]=[0111]

0	0	0	1	0	0	0	0
0	0	0	1	1	0	0	0
0	0	0	1	1	0	0	0
0	0	0	0	1	1	0	0
0	0	0	0	1	1	0	0
0	0	0	0	0	1	1	0
0	0	0	0	0	1	1	0
0	0	0	0	0	1	1	1
SB0'		SB1'		SB2'		SB3'	